MACHINE TOOL BLUE BOOK

JUNE 1943

9 Times FASTER than a miller on this job . . .



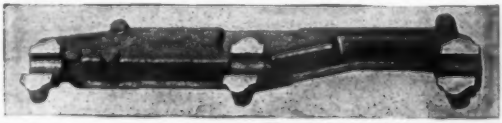
True-Surfacing of this box rim done free-hand without a complicated milling fixture.



PORTER-CABLE

Wet-Dry Belt SURFACER

Five to fifty times faster, this high-precision machining method is so simple that unskilled workers quickly become big producers on grinding flat or parallel surfaces, squaring, forming radii, chamfering, removing tool marks, and polishing. Works on both hard and soft metals, plastics, compositions. Write or wire for complete information and applications.



Generating arc, grinding smooth finish, and holding tolerance of .0015".

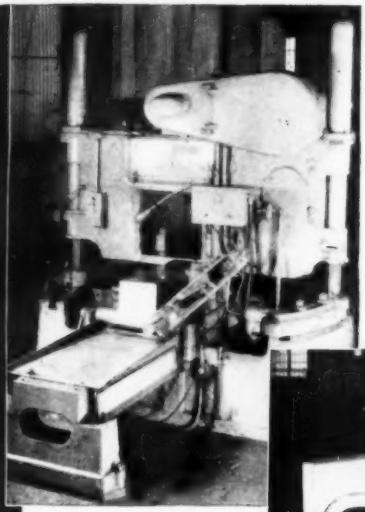
Three interrupted surfaces simultaneously faced to microflatness, 10 TIMES FASTER than on a miller.

PORTER-CABLE MACHINE CO.

300-6 Exchange St., Syracuse, N. Y.

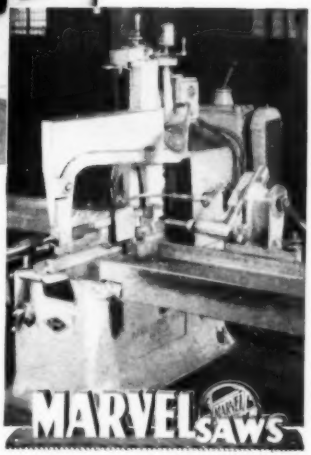
In most forge shops work starts with . . .





MARVEL SAWS

★



Sawing off billets is heavy duty work and in most forge shops, as in most other places where sizes are large and cutting jobs tough, you will find MARVEL Hack Saws—usually one or more high speed heavy duty all-ball-bearing MARVEL No. 6 or No. 9 Production Saws for automatically cutting off quantities of identical lengths, and at least one MARVEL No. 18 Giant Hydraulic Saw to cut-off the largest sizes (18"x18") and toughest alloy steels in absolutely minimum time.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVE. **CHICAGO, U. S. A.**

Eastern Sales Office: 225 Lafayette St., New York

HOBART SAYS WELD AT FULL SPEED WITHOUT SACRIFICING QUALITY



Faulty Welds waste material, and they're dangerous if you try to "get by" with them. Hobart's easy control makes good welds easier to get.



Identify At a Glance. Good welds and bad welds are shown on Hobart's Check-Charts. Gives a positive check on your performance.



How To Get a Good Weld. Hobart shows you how to deposit every ounce of melted electrode usefully in the joint.

It's little use to weld along at an enormous footage per hour only to find that later the weld has to be chipped out and rewelded. Correct electrodes, correct speed of travel and correct welding current help lick waste in materials and manpower, at the same time give the strongest possible weld. Hobart's Check-Charts help you with these three essentials.

HOBART BROS. CO., Box TB-63, TROY, O.

"One of the World's Largest Builders of Arc Welders"



HANDY REFERENCE WALL CHARTS — *HOW MANY CAN YOU USE?* — *Gives much usable shop information* — **FREE**

HOBART BROTHERS COMPANY

HOBART "Simplified" ARC WELDERS

HOBART BROS. CO., Box TB-63, TROY, O.

Send me copies of your informative charts.

- ☐ Hobart Check-Chart, _____ copies
- ☐ Electrodes and Accessories, _____ copies
- ☐ "Practical Arc Welding Manual" $2

Name_____

Firm_____

Address_____

RIVETT 608

FOR FINE PRODUCTION, REPAIR AND EXPERIMENTAL WORK

The Rivett 608 is a super-precision, back-geared, screw-cutting bench lathe capable of handling a great variety of parts within the closest precision limits. Finely made attachments for milling, spiral cutting, slotting, relieving, taper turning, ball turning, grinding, forming and multiple turret operations are available. Swing is 8½"; collet capacity is 1"; center distance is 18¼"; thread range is 10 to 144.

Write for Bulletin 608



RIVETT LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS., U.S.A.

HARDINGE



SPECIFICATIONS

1" collet capacity, 14" longitudinal, 13¼" vertical, 5½" transverse travel, eight speeds from 110 to 1850 R.P.M. TM model for plain milling, UM model for spiral milling.

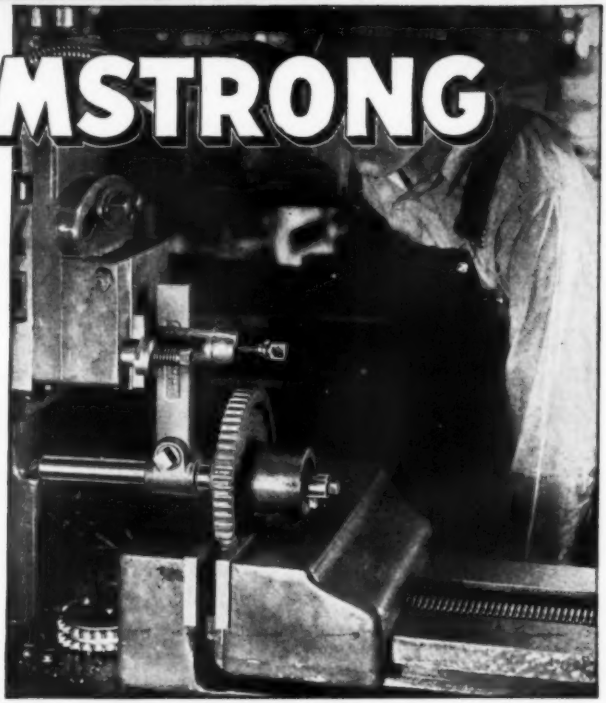
HIGH SPEED PRECISION MILLING MACHINE

Precision tool room milling is profitable on this milling machine, designed to meet a definite need in the tool room and laboratory. The precision construction, along modern lines, combines ruggedness with extreme accuracy for ease of operation. Investment and time cost will indicate that larger milling machines are extremely expensive and awkward for many tool room and laboratory milling operations.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR

HARDINGE
ELMIRA, N.Y.

ARMSTRONG



"ALL-OUT" means All ARMSTRONG

With the correct ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters and shapers you are tooled-up for all-out production. With ARMSTRONG TOOL HOLDERS you are ready to start work with the selection of a cutter and the tightening of a set screw.

With ARMSTRONG TOOL HOLDERS you can step-up speeds and feeds for they will stand up to any cut a machine tool can "pull"—will cut efficiently at speeds and feeds far above those generally practiced as "standard."

With ARMSTRONG TOOL HOLDERS you will reduce the high speed steel requirements for any operation 90%—for in an ARMSTRONG TOOL HOLDER an ounce of high speed steel will do the work requiring 10 ounces in a forged tool.

With ARMSTRONG TOOL HOLDERS you will be tooled-up "for the duration" and for the change-over to peacetime production after the war because each is a permanent multi-purpose tool—a basic tool wherever metal is to be machined.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

308 N. FRANCISCO AVE. CHICAGO, U. S. A.

Eastern Warehouse & Sales: 199 Lafayette St., New York

ARMSTRONG TOOL HOLDERS Are Used in Over 90% of the Machine Shops and Tool Rooms

Machine Tool Blue Book

Hitchcock Publishing Co., 542 So. Dearborn St., Chicago

Published Monthly *Volume 39, No. 6*

JUNE 1943

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Something New in an ANGLE TANGENT to RADIUS *Dresser*



A Vernier	**F** Dressing Tool Mounting
B Stop Pins	**G** Hand Wheel for Dressing Radius
C Dressing Diamond	**H** Hand Wheel for Dressing Angle Tangent to Radius
D Radius Adjustment Block	**I** Lock
E Tangent Slide	

Now you can save valuable "set-up" time in your plant. With this newly designed Perfex Dresser you can automatically locate your diamond tool on perfect center—quickly and accurately. This is accomplished by Perfex's exclusive feature, of the diamond mount construction and the way in which the shank of the diamond tool is ground. To illustrate this, notice the front view of the dresser (see cut) showing the 90° vee ground in the dresser's diamond mount block and also the two flats ground on the diamond tool shank. Thus when the diamond shank is placed in position in the 90° vee of the mount block it automatically places the diamond point in perfect center.

For complete specifications about this time-saving dresser, write or wire us today!

★ *Features* ★

1. Diamond automatically locates on center.
2. Radius can be set accurately to within .0001.
3. It is possible to return the diamond to center after dressing an angle within .00005.
4. It is possible to dress a smaller than .050 radius to a full half circle *without additional attachments.*
5. The Perfex Dresser dresses in horizontal position *exactly* in the plane in which the work will be ground.
6. The vernier is very legible, and can be easily read from normal position.
7. All moving parts made from hardest steel ground and lapped to a perfect fit.
8. All surfaces protected from rust.

DELIVERY *Reasonable delivery can be made on all Perfex Dressers with necessary priorities.*

PERFEX DRESSER CORPORATION

3607 GAYLORD . . . DETROIT, MICHIGAN

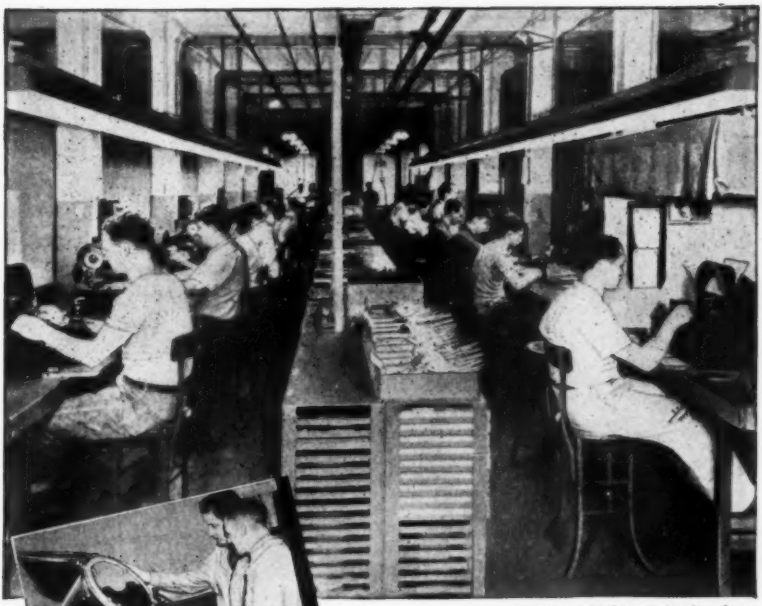


Photo Courtesy The Eastern Machine Screw Corp.



Modern inspection by optical projection saves time and money

Jones & Lamson Comparators are available in Pedestal, Bench and other types to meet every need in the field of Inspection by Optical Projection. We shall be pleased to study your problems and apply to them the accumulated experience of more than twenty years in this field.

Profit-Producing J&L *Machine Tools*

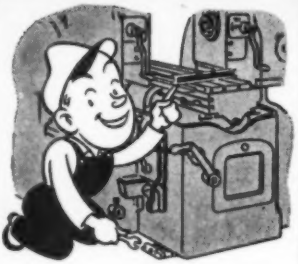
JONES & LAMSON MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

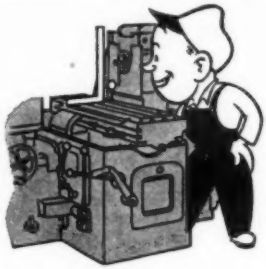
Manufacturers of Ram and Saddle Type Universal Turret Lathes · Fay Automatic Lathes · Automatic Thread Grinders · Optical Comparators · Automatic Opening Threading Dies and Chasers.

WHEN THE BIG





Level the machine periodically. It's easier to do and longer lasting when machine is mounted on leveling blocks.



Check the headstock level accuracy by "tramming", with indicator gage fastened to spindle nose.

THE CINCINNATI MILLING MACHINE CO.

FELLOWS ARE ON THE LEVEL

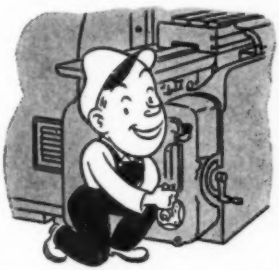
They'll Cut Straight . . .

The principal reason why large milling machines do not cut straight is because of inadequate foundations and lack of attention to periodic and accurate releveling. True enough, once the machine is installed, the operator or department supervisor can do little about the foundation, but they *can relevel the machine periodically.* And it's so easy to do. The little fellow at the bottom, in the first two illustrations, shows you how it's done on CINCINNATI Hydromatic Milling Machines.

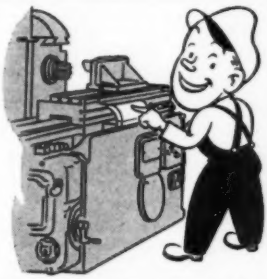
There are other factors, too, in keeping your Hydromatic running continuously while turning out a high volume of accurate work.

1. ***Level the machine periodically.*** **Once every six months should do the job. Leveling blocks should be used for all but the smallest machines.**
2. ***Follow lubricating instructions.*** **A lubricating schedule tag tied to the machine serves as a convenient reminder.**
3. ***Use clean containers for the oil,*** **especially oil for the hydraulic unit.**
4. ***Clean the hydraulic oil filter.*** **Once or twice a month should be sufficient.**
5. ***Keep the guard in place over the feed trip plunger.*** **This will help prevent accidents; will keep grit and coolant out of feed trip mechanism.**
6. ***Loosen quill clamping nut*** **before making quill adjustments.**

The above routine is just as easy to follow as it looks. Try it—give the machine a chance to make a production record equal to your attendance record.



With a small wrench, the hydraulic oil filter may be cleaned in a few seconds. Do this at least once a month.



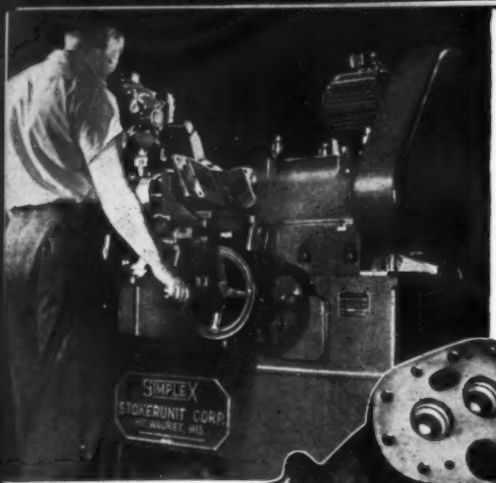
With the guard in place, there's no chance for the operator to get his fingers caught between the table dogs and trip plunger

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

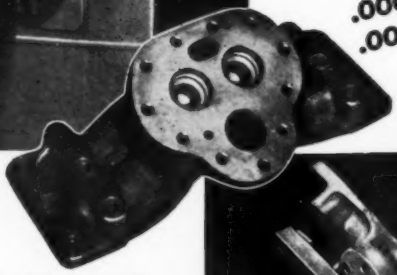
MACHINES

Two Bearing Seats in Pump Manifold Precision Bored to These Tolerances:

.0003" in Location
.0005" in Diameter



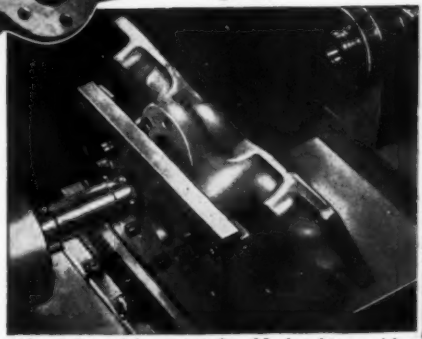
(Above) This versatile machine offers a wide range of applications.



(Left) Extreme location and diametrical accuracy required in both ball bearing seats.

Actual Boring Time 35 Seconds per Seat on

STOKERUNIT SIMPLEX *Precision* BORING MACHINE



(Above) Special fixture is indexed by hand in precision boring second seat. Boring time is 35 seconds per seat.

On this job, extreme accuracy is indispensable in line-up of ball bearing seats in manifold and cover. Diametrical accuracy is of equal importance.

Stokerunit Simplex precision bores each seat in manifold in 35 seconds, holding location to .0003", diameter to .0005", and depth to .001".

By maintaining these close tolerances, Stokerunit equipment has substantially reduced the number of throw-outs experienced on previous equipment. In addition, a polish finish is maintained.

Additional Data: Diameter of bore 2.0472"; depth .602"; stock removal 1/32". Stock, cast iron, Brinell 180-200; cutter, tungsten carbide. Spindle speed 400 r.p.m.; feed 2 3/8" per min. Indexed by hand.

Versatility as well as Accuracy and Speed

The Stokerunit Simplex Precision Boring Machine used on this job is the Series 200 3-Spindle Double-End. Each end being individually driven, only the single-spindle end is in operation in precision boring these pump manifolds.

Because of its versatility, this same double-end machine with different fixtures is used in precision boring various parts for a full range of differently sized pumps.

Over 25 models of Stokerunit Simplex Precision Boring Machines are available to solve your precision boring problems. Furnished in mechanical or hydraulic feeds, with single or multiple spindles, for short-run or production work.

For specific recommendations, send blueprints of parts with your production requirements. No obligation.



WRITE TODAY for these two booklets covering our entire line of Simplex Precision Boring Machines.

STOKERUNIT CORPORATION

DESIGNERS AND BUILDERS OF PRECISION BORING MACHINES AND MILLING MACHINES

PRECISION PARTS Like These *Complete*..IN ONE OPERATION



NOTE WIDE RANGE OF WORK
SMALLEST .005" dia. by 1/32" long
LARGEST 7/16" dia. by 2 3/4" long

PARTS SHOWN ACTUAL SIZE

GORTON 16-A
Precision Automatic Screw Machine

achieves new advances in accurate, high speed, versatile screw machine production. Diameters from .005" to 7/16" and lengths from 1/32" to 2 3/4" demonstrate the extensive range of work which can be produced on the 16-A.

The samples, shown here in actual size, represent the almost endless variety of simple and complex precision parts which the 16-A produces—complete—in *one* operation.

In addition to step and contour turning and chamfering, the 16-A, with attachments, also automatically performs centering, drilling, threading and slotting operations.

EXCEPTIONAL ACCURACY AND QUALITY OF FINISH—High dimentrical accuracy—work rigidly supported at point of cutting tool load. Unusually high finish—grinding often eliminated.

LOW TOOL AND OPERATING COST—Maximum accessibility for quick setups. Uses only standard single point tool bits. Micrometer adjustments on every tool. Centralized controls—infinitely variable speeds and cam feeds at touch of dials.

LONG LIFE OF PRECISION PERFORMANCE—Slow, smooth operating movements, elimination of indexing or spindle reverse, and complete freedom from vibration insure a long life of efficient service.

COMPLETE TOOL AND CAM SERVICE... *No charge or obligation*

OUR GOLDEN ANNIVERSARY
1893-1943

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GEORGE GORTON MACHINE CO.
1317 Racine St., Racine, Wis.

Send me, without obligation, FREE bulletin with complete information covering the Gorton 16-A Precision Automatic.

Name.....Title.....
Company.....
Address.....
City.....State.....

GORTON

GEORGE GORTON MACHINE CO

1317 RACINE STREET, RACINE, WISCONSIN, U. S. A.

Increased Tapping Output With

New "TRU-GRIP" TAP HOLDER

Equipped with Morse Taper Shank

• Production line tests show definitely that speedier, more accurate tapping with less tap breakage, results when this new Tru-Grip Tap Holder is used. It is equipped with Morse Taper Shank for more efficient tapping on machines with reversible spindles and multi-spindle drill presses. Shank and body are hardened and ground for maximum accuracy. Special design makes this the lightest tap holder on the market — one-third the weight of conventional tap holders.



Offers many exclusive features

A broached section in the chuck receives the flattened surfaces on the spring collet, while the tap has a positive drive through the square hole broached in the collet. The tap is held in true alignment by the round of its shank, and tap shanks are never scored or disfigured. Other features include: Wide range of tap capacity; one-piece body and shank; accepts standard size taps.

Send For Bulletin

giving full details, prices, specifications of "Tru-Grip" Tap Holders; Collets, as well as Procunier Tapping Heads and Procunier Tapping Machines.

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SAFETY CHUCK CO.

14 S. CLINTON ST. **CHICAGO, ILL.**

Procunier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Send me bulletins on: ( ) Tru-Grip Tap Holder. ( ) Universal Tapping Machines. ( ) High Speed Tapping Heads.

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Address .....

City..... State.....



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If you're machining copper, brass, bronze or nickel silver, this 32-page Anaconda Publication will prove helpful in determining the most effective cutting speeds, feeds, tool rakes and clearances to be used on more than 40 copper alloys. Production engineers and machine operators are finding this new booklet helpful in getting the most out of their machining operations. Your engineering department will also find much useful data in the tables of compositions, physical constants and physical properties, convenient weight tables, conversion factors and references to Standard Specifications. Use convenient coupon.

43162A

THE AMERICAN BRASS COMPANY
Waterbury, Conn.

Please send copy of the manual, B-3, "Machining Copper and Copper Base Alloys."

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ANACONDA

Anaconda Copper & Brass

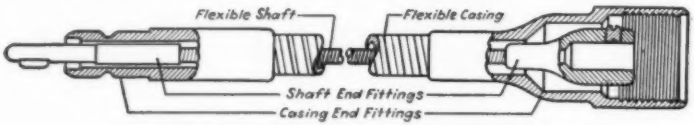
THE AMERICAN BRASS COMPANY, General Offices: Waterbury, Connecticut

Subsidiary of Anaconda Copper Mining Co. • In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

TO EXPEDITE THE WORKING OUT OF FLEXIBLE SHAFT APPLICATIONS

With a view to avoiding waste motions and delay, we review here the procedure in working out a flexible shaft application for power transmission or remote control, with particular stress on the data required.

A TYPICAL FLEXIBLE SHAFT AND CASING COMBINATION



THE 4 STEPS IN WORKING OUT AN APPLICATION

1 — Clearly define the requirements to be met.
2 — Select the Flexible Shaft that meets the requirements.
3 — Select the proper Flexible Casing to go with the shaft.
4 — Select or design End Fittings for connecting shaft and casing to driving and driven or controlled members.

DATA NEEDED TO DEFINE REQUIREMENTS

Before it is possible to select a shaft of the proper size and physical characteristics, the following data must be determined.

FOR POWER DRIVE APPLICATIONS

1. Power to be transmitted or Torque load on shaft.
2. Speed of rotation (r.p.m.)
3. Direction of rotation.
4. Nature of service (continuous or intermittent).
5. Radius of smallest curve in which shaft is to operate.
6. Required length of shaft.
7. Nature of parts to which shaft is to be connected.

FOR REMOTE CONTROL APPLICATIONS

1. Torque load on shaft in lb.-ins. or oz.-ins.
2. Degree of accuracy or synchronization required in the control.
3. Radius of the smallest curve in which shaft is to operate.
4. Required length of shaft.
5. Nature of the parts to which the shaft is to be connected.

Once you have these data it is a fairly simple matter to pick the right shaft from the list of S. S. White Power Drive Flexible Shafts in **BULLETIN 1238,** or the list of S. S. White Remote Control Flexible Shafts in **BULLETIN 38-42.** These bulletins also contain data on S. S. White Flexible Casings. The subject of End Fittings for connecting shafts and casings is covered in **BULLETIN 43.** Copies of these bulletins will be mailed on request.



Until Victory is won our products and service must be confined to work directly connected to the war effort.

S. S. WHITE

The S. S. White Dental Mfg. Co.

INDUSTRIAL DIVISION

Dept. H, 10 East 40th Street, New York, N. Y.





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AS the production of aircraft engines has increased, thousand upon thousand, to tremendous quantities, so also has the production of Jarvis Power Tools. Their output has kept in step with this greatly expanded aviation program.

Jarvis High-Speed Tapping Attachments are available in sizes from No. 2-56 to 2" capacity.

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

SPEED-UP WAR PRODUCTION JOBS

with this precision machine of a thousand uses

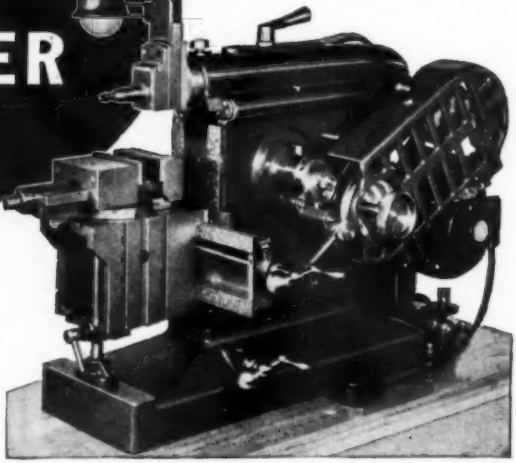
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IT'S PORTABLE

--Saves Steps and Time

AMMCO 7″ SHAPER





Just wheel up to bench - - plug in - - go to work!

On jobs requiring a stroke of 7″ or less, the AMMCO 7″ PRECISION SHAPER will enable you to save a lot of time and expense in a set-up which would be required for larger shapers. Furthermore, the AMMCO will enable you to get away from the cost of operating a big shaper on small work.

Portable Cabinet, as shown above at left, available as optional equipment, enables this shaper to be moved about the shop. It can be rolled from one job to another, and can be brought right up to machine or bench where man is working...Write today for specifications and prices.

AUTOMOTIVE MAINTENANCE MACHINERY CO.

2106 Commonwealth Avenue **North Chicago, Ill.**

Here's a screw driver bit that has

more lives

than a cat



Apex-Phillips Power Bits do wear out eventually, but Apex Reconditioning Service gives them many lives.

When you have Apex-Phillips Bits reconditioned, you not only save important money, but you help our War Effort by conserving a vitally critical material . . . Tool Steel.

Do not scrap your worn out Phillips Bits—send them to us for reconditioning. They will be returned promptly, just as good as new bits.

When you buy Apex-Phillips Bits and use Apex Reconditioning Service you can then be sure your tool cost per thousand screws driven is down to rock bottom.

Write for Catalog #15 for complete information.

APEX

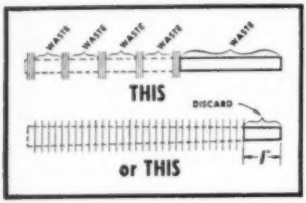
THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of Power Bits for Phillips, Slotted Head, and Clutch Head Screws; and Hand Tools for Phillips and Clutch Head Screws.

Phillips Bit Reconditioning Service for the Pacific Coast at the Burklyn Co., 3429 Glendale Blvd., Los Angeles, Calif.

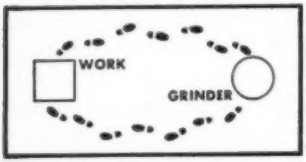
CONVERT DOWNTIME INTO PRODUCTIVE TIME

Let's CUT OUT *waste in* CUT-OFF *operations*



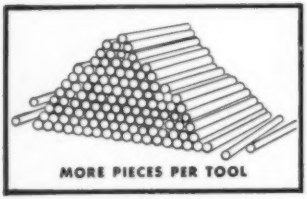
Each time you re-sharpen an ordinary cut-off tool, do you grind away good portions of it in order to obtain proper side and back clearances? How much is taken off at each grind?

Because one of the features of the Empire Tool Company's Luers Patented Cutting-Off Blade is the tapered longitudinal cutting edge, no wasteful grinding for back clearance is ever necessary. Back clearance is retained during entire life of blade. The front face is the only part ever touched to grinder. Blade retains its full efficiency until it is within one inch of its original length.



How many trips from work to grinder does your cutting-off tool take every day?

Because EXCESSIVE FRICTION—the cause of wear—has been eliminated through the unique design, these cutting-off blades "stay on the job" many times longer than ordinary cut-off blades can. Loss of man-hours or machine-hours, due to downtime, considerably reduced.



How many pieces will your cut-off tool produce before it must be reground?

Because these cutting-off blades perform without creating excessive friction, they naturally "can take it" for lo er stretches of time. The causes of breakdowns of cutting edges and the need for frequent regrinding are removed. These features, plus the advantages possessed by the unique holders which permit quick and simple release and replacement of the blades for regrinding, increase production.

THESE EXCLUSIVE FEATURES WILL MAKE YOUR CUTTING-OFF OPERATIONS MORE EFFICIENT



Parallel Blades on Longitudinal Cutting Width Available for Shallow Cut-offs and Grooving Operations. Cutting-off Blades shipped immediately from stock. Send for Catalog.

Empire Tool Company manufactures Luers Patented Cutting-Off Blades and Holders under license issued by John Milton Luers Patents, Inc.

BUY WAR BONDS

The Blades That Reduce Friction

EMPIRE *Tool Co.*

8782 Grinnell Ave.
Detroit, Mich.

UNIVERSAL TOOL AND CUTTER GRINDER

One machine for all Tool Grinding.

Cylindrical, Internal, Radius, Tap Grinding.

Every attachment readily interchangeable.

Quick delivery through increased production.



DOUGLAS MACHINERY CO., INC.

NEW YORK, N. Y.

Tool up with TECO!



No matter how good your machines or skilled your operators, their capacity is limited by the capacity of the cutting tools used. With TECO Carbide Tools, your speeds are higher—more metal is removed per day — tolerances hold longer — more pieces produced between grinds.

TECO Carbide Tools are proving this every day throughout leading metal working plants. The reason is found in the harder, denser, more uniform TECO Carbide which has greater resistance to wear and breakage. TECO Carbide Tools and Blanks are available promptly for practically every machining operation. Tell us your needs. Write for new catalog giving full specifications.

TECO CARBIDES

...cut at higher speeds

... hold cutting edges longer

...produce more pieces between grinds

... reduce grinding and re-tooling time

TUNGSTEN ELECTRIC CORPORATION
565 39TH STREET, UNION CITY, NEW JERSEY
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects & Builders Bldg., Indianapolis, Ind.

Pioneers in Tungsten Carbides for over a Quarter Century

TECO CARBIDE TOOLS



HATS OFF TO AMERICAN WOMEN!

THEY, TOO, ARE DOING JOBS NEVER THOUGHT POSSIBLE!

★ In this war, as in World War 1, American women are answering Uncle Sam's call to fill the ranks in Industry as more and more men are enlisted in our armed forces. With alert minds and nimble fingers, thousands of American women are performing their tasks on machines and assembly lines with a fine sense of loyalty and patriotism. And they are doing their work well . . . work that in many cases calls for unusual mechanical ability.

For example . . . here are women operating a battery of Greenlee 6-Spindle Automatics in the Detroit plant of the Ex-Cell-O Corporation. They are operating these accurate, high-production machines entirely satisfactorily. Yes . . . women, too, are doing jobs never thought possible.

And What About the Job of Training New Operators?

When it comes to Screw Machines, training new operators is never a quick or easy task, but there are many advantages offered today in machine designs that shorten the training period . . . make possible the use of women operators. For instance, here are a few of the mechanical improvements found in Greenlee Automatics that greatly aid and simplify the task.

1 ***Wide-open tooling area*** provides easy access to tools, more elbow room for set-ups. Low height affords clear view of working parts, reduces strain on operators.

2 ***No cams are required on main tool slide,*** adjustments are simple. Exact settings for stroke are quickly made by adjusting a dog on a graduated worm wheel.

3 ***Cross Slides, independently operated*** with separate cams, permit better tooling set-ups, increase production. Cams are interchangeable, eliminate special camming, save set-up time.

4 ***Wide range of speeds and feeds*** are easily obtained by changing multi-splined pick-off gears. On machine of 1⅝" O. D. capacity, spindle speeds range 105 to 2625 R. P. M., feed range .0017 to .0388.

Greenlee Engineers stand ready and willing to assist you with any of your Screw Machine Problems.

GREENLEE BROS. & CO.

1836 MASON AVE., ROCKFORD, ILL.

FASTER...CUT FASTER TO VICTORY



Warren

SPECIAL CUTTING TOOLS

Our tools have a double advantage for you—their workmanship is so superior that they actually cut faster and so help the defense program—

—and they save you time and money as they do more work in less time, all of which helps you make your production quotas while you decrease your costs.

For your special cutting tools (we carry no stock) this plant offers you an unusually extensive experience which means accuracy, dependability and attractive deliveries.

We make special cutting tools of all types, let us quote on your immediate needs; you will not be disappointed.

Some attractive territories are still available for energetic agents.

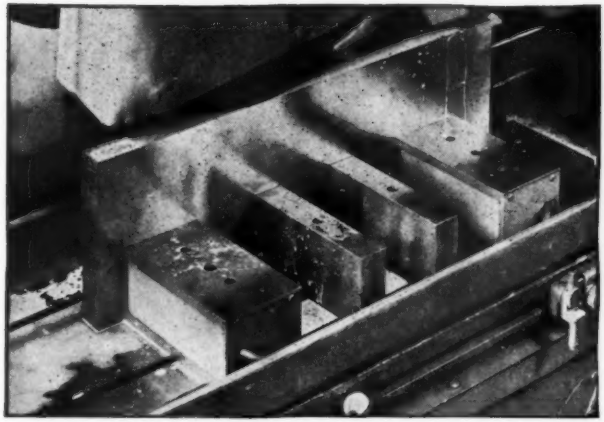
WARREN INDUSTRIES

26669 MOUND RD.

WARREN, MICHIGAN

ONLY SECONDS REQUIRED

For either Vertical or Horizontal Set-ups



End and top surfaces of these powerful magnetic chucks instantly available.

Holding Work Magnetically, Is Expanded with Anderson & Brown Magnetic Chucks

The wide acceptance of Anderson & Brown Magnetic Chucks in defense operations reveals the present urge for greater use of magnetic holding methods; for holding devices that are flexible and adaptable. With sizes ranging from small to large, the Anderson & Brown Chucks offer a means of modernizing your holding methods.

It will pay you to investigate.

Send for "Magnetic Chucking Revolutionized."

ANDERSON & BROWN CO.

2036 East 22nd. St. Cleveland, Ohio

Empire AUTOMATIC DRAWBAR

For Atlas, Logan & So. Bend Lathes



8 *REASONS WHY!*

1. No holes to drill.
2. Gear guard remains in place.
3. Bearing adjustment nuts undisturbed.
4. Concentric—necessary for high speeds.
5. Good differential between open and closed.
6. Easy to mount—takes only 3 minutes.
7. All necessary parts hardened and ground.
8. Can be furnished for 3-AT, 1A and 3C collets.

Specify type of collet sleeve wanted.

PROMPT DELIVERY *COMPLETE* **$55.00**

FISHER TOOL COMPANY
226 Lafayette Street, New York

This Simple Principle of Design

Plus This Fool-Proof Heat Control

Guarantees that this Upton Electric Salt Bath Furnace

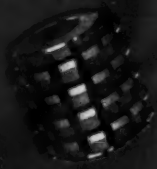
Will Harden this Hob so Accurately and Uniformly

that it Will Not Require Finish Grinding!









COMMERCIAL HEAT TREATERS DO BETTER WORK

with UPTON Electric Salt Bath Furnaces

The three principal problems of commercial heat treaters are all solved with Upton Electric Salt Bath Furnaces and Upton heat measuring controls.

Inexperienced help can use the Upton Heat Measuring Control to get perfect results, all the time.

Moly steels are easily handled with the Upton Electric Salt Bath Furnace.

Predictable size change is so exact—with Upton Electric Salt Bath Furnaces and the Upton Heat Measuring Control—that finish grinding is entirely eliminated on many tools—the same kind of tools that formerly required finish grinding.

Electrodes are out of the working area and can be changed in a few minutes, without special equipment and are usually of low cost, mild steel.

Upton Electric Salt Bath Furnaces are available for inspection in Detroit under actual *Commercial* heat treating conditions. Ask for complete information now. (To save time, why not give us a description of the work to be handled?)

Upton ELECTRIC FURNACE DIV.

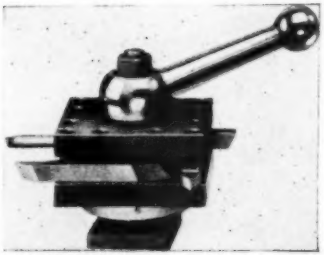
UPTON Electric Salt Bath Furnaces are available for all types of Heat Treating from 300° to 2500° F.

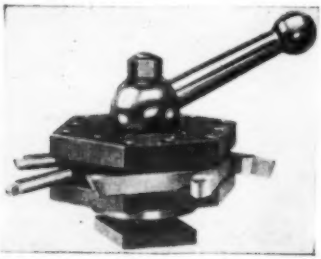
CONVERT TO TURRET LATHES WITH THESE ATTACHABLE LATHE TURRETS

Model "S"—Four tool 8 position tool post turret, 2½" square. Shipping weight 4 lbs. Fits 9" So. Bend Workshop, 10" Atlas, 10" Logan.....$23.00 FOB N. Y.

3½" square turret for Atlas, Logan, and So. Bend.....$31.00 FOB N. Y.

Model "4S"—Four tool 8 position tool post turret, 4" square. Shipping weight 12 lbs. Unfinished base can be machined to fit up to 16" swing lathe..... .....$49.50 FOB N. Y.





Model "6S"—Four tool 8 position tool post turret, 6" square. Shipping weight 35 lbs. Unfinished base may be machined to fit 16" to 24" swing lathe..... .....$99.50 FOB N. Y.

Model "H"—Six tool 12 position turret tool post, 3" hexagon. Shipping weight 4 lbs. Fits 9" So. Bend Workshop, 10" Atlas and 10" Logan.....$25.00

Note: The tools shown in these pictures are for illustrative purposes only and are not included in these tool post turrets.

These new adjustable turret tool posts, designed for bench and small engine lathes and small screw machines, are carefully engineered lathe accessories that have many advantages: There are two positions for each tool, giving 8 and 12 positions on the four and six tool turret tool posts respectively. Take standard square tool bits and boring tools.

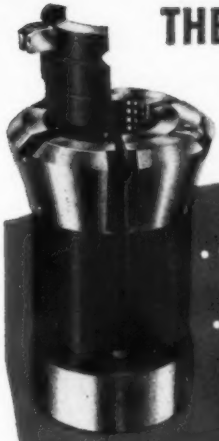
Head can be raised or lowered to center tools. Turret is rigidly mounted in T-slot of compound. Indexing is easy, accurate and positive. Indexing mechanism is self-contained, eliminating all possibility of chip interference. Case-hardened steel construction. Eliminates many second operation set-ups. When ordering, give make of lathe and swing.

IMMEDIATE DELIVERY!

PRIORITY RATINGS MUST ACCOMPANY ALL ORDERS

We carry a complete line of H.S. Drills, Milling Cutters, Lathe Tools, H.S. and C.S. Taps and Dies, Drill Chucks, Lathe Chucks, Files, Special Taps and Dies, etc.

CENTER TOOL *Machine Shop Equipment* **CO. 153 CENTRE STREET, N.Y.**



THE COLLET THAT CONTRIBUTES

To The War Effort

...SAVES CRITICAL STEEL

...SAVES PRODUCTION TIME

...REDUCES COLLET INVENTORIES

When you use Martin Master Collets, replacements due to wear are limited only to the pads. You don't discard entire collets, and you don't require complete new collets which require critical nickel steels in their manufacture.

They reduce collet "change-over time" to an absolute minimum. A complete change of collet size is accomplished in from five to seven minutes. And because the pads produce the required sizes, a considerable reduction can be effected in inventories usually maintained for solid collets. A supply of pads in various sizes, occupying very little storage space, will meet innumerable requirements.

With the Martin Master Collet, interchangeable pads are removed from the end of the collet. The collet itself remains in operating position in the machine. The pads are integral parts of the locking wedges which fit tightly into the end of the collet. They will positively not become loose. When it is necessary to change the pads, a few turns of the wedge screws permit quick removal.

THE MARTIN MASTER COLLET

Manufactured By

MODERN COLLET and MACHINE CO.

403 Salliotte Street - - - Ecorse, Michigan



Bending ON SCHEDULE



all types of CIRCLE, SEGMENT AND SPIRAL FORMS

A GLANCE to the left shows the wide range of stock which can be handled rapidly and *accurately* by a Buffalo Bending Roll — and explains why metal bending output need never lag! Even unskilled labor can be put on these husky, easy-to-control machines, with full confidence that schedules will be met, and with a minimum of rejects. Full engineering data on Buffalo Bending Rolls for aircraft and general fabricating application will be sent promptly on request. In writing, please state the size, shape and material to be handled.

BUFFALO FORGE COMPANY

161 Mortimer St. Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" BENDING ROLLS



★

DoAll Band File at work on a Master Gage in the Chance Vought Aircraft plant, home of the new 2000 H. P. Corsair Warplane.

★

DOALL THE BAND FILES USED BY EXPERTS

DoAll Files are the result of years of research by leading metallurgical engineers who maintain that every kind of metal, plastic, alloy, etc. needs a special style, size and cut file.

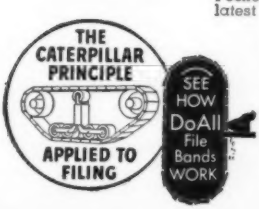
By using the proper file each time, you not only save files, but smash former time schedules. DoAlls get jobs done in 1/5 the time of jig filing, 1/8 that of hand filing.

It's the steady, one-way travel of DoAlls and their solid, even filing surfaces that insure a perfect finish every time.

ARE YOU STUMPED BY A TOUGH JOB?

Send it to our File Clinic. We'll put it through a series of laboratory tests and send you a written report recommending the proper file, best speed, table tilt, coolant, etc. No charge for this service—why not take advantage of our facilities?

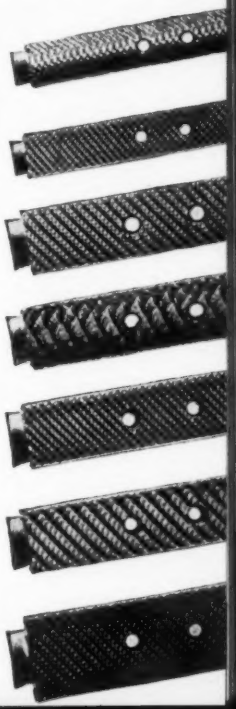
Send for DoAll File Booklet
Pocket size, well illustrated. Lists all the latest sizes and styles of DoAll Files.



The DoAll Company

1206 Thacker Street
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DoAll Offices in 25 cities, each in charge of a trained engineer to give you quick service on DoAll Band Files and Saws, DoAll Contour Machines, DoAll Gage Blocks and Surface Grinders.





IT'S *Faster* AND **EASIER** WITH **IDEAL**

LIVE CENTERS

IDEAL Live Centers turn heavier loads FASTER. Get more work . . EASIER . . out of lathes, grinders, etc. Take deeper cuts at higher speeds. IDEAL Live Centers rotate with the work. Fitted with high precision radial ball bearings and taper roller bearing. All parts are hardened and ground. Save cost of fast wearing dead centers.

TRIPLE DUTY

Three Interchangeable center pieces for all kinds of centered and uncentered work. An exclusive IDEAL feature.



METAL ETCHER



FREE

Machine Tool Accessories Catalogue Illustrates and Describes many IDEAL Products for Speeding up War Work.



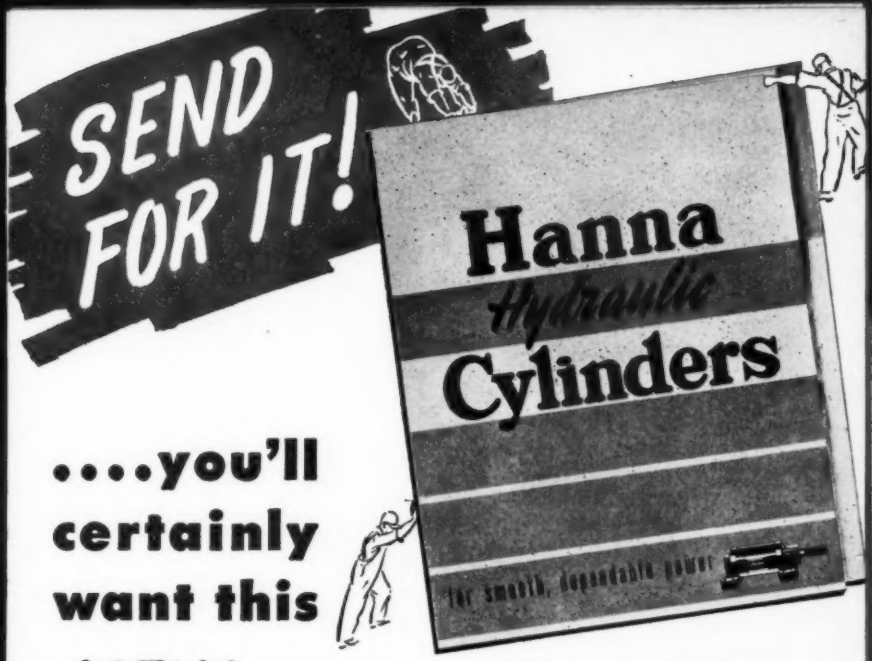
THE IDEAL Metal Etcher prevents loss and confusion by permanently marking identification on all smooth-surfaced tools, dies, metal parts and products. Has 14 etching heats. Low heats for fine lines on small and thin parts; high heats for bold lines on large and heavy parts.

MOST COMPLETE LINE ON THE MARKET

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....you'll certainly want this *NEW* HYDRAULIC CYLINDER CATALOG!

IT is packed full of the information you need to select the *right* hydraulic cylinder *quickly*. Containing complete cylinder specifications, engineering data and charts, the new catalog is an informative time-saver for busy engineers.

Send for your copy today — it's free to executives and engineers. When you write, tell us about your Hydraulic Cylinder applications.

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Air & Hydraulic RIVETERS • CYLINDERS • Air HOISTS

and now . . .
another
CONWAY
CLUTCH
improvement



XYZ TYPE CLUTCH
WITH SHEAVE WHEEL MOUNTING

Note the sheave wheel . . . designed and engineered as a big step forward in efficiency: self-contained . . . compact . . . capable of delivering the full power load to be transmitted.

Patented in U. S. A. and Canada.

In addition, you enjoy the great Conway Clutch features:

modern drive	no exposed actuating parts
instant stopping	centripetal action
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ease of engagement	fully enclosed
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and many others

Prompt delivery on models of catalog dimensions.

The CONWAY CLUTCH Co.

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with Mall TRADE MARK CONSTANT HIGH SPEED GEARED HEAD GRINDERS

GEARED HEAD

Reduce Rejects ● Lengthen Tool Life

- Operate independently of all other tools on 110-220 or 220-440 volt 3 phase, 60 cycle current
- Deliver 3450 r.p.m. Geared head steps speed up to 4500 r.p.m.
- Provide constant speed underload
- Tools are free from motor weight
- Furnished with caster base or overhead trolley mounting for maximum portability
- Interchangeable tools for Grinding, Disc Sanding, Wire Brushing, Polishing and Drilling — can be changed as easily as bits in a brace
- Available for Victory Production. Write for literature and prices.

USE IT FOR

- Grinding Off Welds
- Finishing Dies
- Wire Brushing Scale from Pipes
- Snagging Castings
- Cleaning Metal
- Sharpening Tools
- Finishing Propeller Blades
- Drilling In Wood, Stone, Concrete, Steel
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MALL TOOL COMPANY

7742 South Chicago Ave. Chicago, Ill.

FULFLO PUMPS and VALVES

Essentials In Your War Work

FULFLO PRODUCTS fit into your program right now . . . just as they will when the war's over . . . and go about their business quietly, efficiently, constantly. Consult the Fulflo Engineers, without obligation.

FULFLO

COOLANT PUMPS

centrifugal

Over 75 types to fit practically any purpose. Where special models or adaptations are needed special service is available.

Pipe sizes ⅜" to 1½".
Motor, direct or belt drives.
Right or left rotation.



Model AOR

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FULFLO

HYDRAULIC VALVES

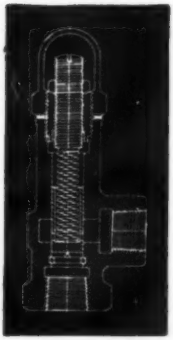
by-pass, oil-relief
non-chattering

Pipe sizes ¼" to 2".

Five different springs for pressure variation, from 0 lbs. to 350 lbs.

Brass, hardened or stainless steel pistons.

Cast iron or bronze bodies.

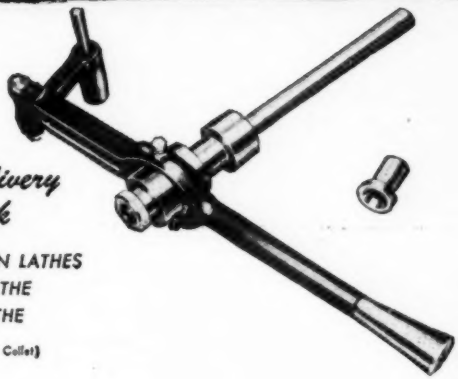


THE FULFLO Specialties Co., Inc.
BLANCHESTER, OHIO

Announcing!

Patent Pending · Infringements prosecuted

THE NEW Precision LEVER-TYPE Drawbar



Immediate Delivery From Stock

FOR 10" ATLAS & LOGAN LATHES
9" SOUTH BEND LATHE
12" CLAUSING LATHE

(4½" Capacity • Requires 3AT Collet)

Makes Obsolete All Existing Models



Simpler and more foolproof than other models, the *Precision* Lever-Type Drawbar's sensational Co-ordinate Cam principle reduces friction to a minimum, eliminating the need for bearings and fingers — results in easier operation . . . It is ruggedly built for continuous production use and will last indefinitely.

The *Precision* name on a Collet or Drawbar is your guarantee of absolute accuracy in machining, hardening and grinding. Make sure then to specify *Precision* when ordering from your dealer. He can supply you promptly. *Literature available on request.*

GENERAL DIE-STAMPING-TOOL COMPANY
PRECISION COLLET DIVISION · 265 Canal Street, New York City

KENNAMETAL'S RULE 6
For Reducing
Tool Consumption

PROPERLY BRAZE KENNAMETAL* TIPS TO RECLAIMED TOOL SHANKS



S-100 S-200 S-300

Your tool consumption can be greatly reduced by the proper brazing of Kennametal steel-cutting carbide tips to steel shanks or to some of those used shanks that have accumulated through the years. Kennametal tools can be made in your shop within a very few minutes by use of the torch brazing technique.

For most efficient results from tools produced in your shop, proper brazing is essential. The following instructions on how to braze these tools will help to give you that efficiency and reduce your tool expenditure.

STEP 1. PREHEATING SHANK

. . . A good quality brazing rod or silver solder is used in torch brazing. The shank is heated at recess with borax or prepared flux. A non-oxidizing flame must be used in brazing and care must be taken to avoid burning or oxidizing the KENNAMETAL blank or the shank.

STEP 2. APPLYING BRAZING MATERIAL TO SHANK

. . . When flux runs freely, recess should be "tinned" by touching a 1/16" rod of brazing material to it, allowing it to melt and run freely over the surface of the recess. The KENNAMETAL blank may then be placed in the recess with tongs or pliers. If silver solder sheet is used, it should be applied when the tip is put in place.

STEP 3. APPLYING TORCH AFTER TIP IS IN PLACE

. . . Cover with flux and heat the underside of shank with torch until flux and brazing material are again melted. Finally the torch may be applied to top of tool.

STEP 4. PRESSING TIP INTO PLACE

. . . Press KENNAMETAL tip firmly into place with tang of file or other instrument and hold it until brazing material has solidified. Allow tool to cool slowly and when quite cool, grind as necessary for the operation to be performed.

STEP 1



STEP 2



STEP 3



STEP 4

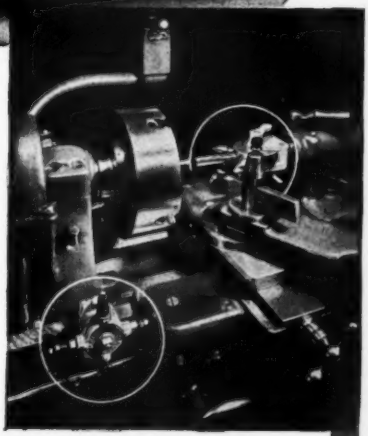


)*INVENTED AND MANUFACTURED IN U. S. A.



KENNAMETAL THE All American CARBIDE

Make Your Present Lathe Do 4 Operations With Only 1 Set-up



CUT COSTS—SPEED PRODUCTION WITH THIS TIME-SAVING TEAM

SPECIALTIES LATHE DEVICES more than double the productive capacity of your machine. Tapping, roughing, boring, finishing, drilling, reaming, forming and counter boring can be done without stops to change tools. You get easy, accurate control for important, precision lathe work.

SPECIALTIES TAIL STOP TURRET quickly converts your engine lathe into a 4-way turret lathe, sharply cutting your machine costs. It gives you four different working positions, each controlled by an indexing lever and held firmly in position by a clamp lever.

SPECIALTIES LATHE STOP is a practical time-saver since it requires measuring only once for each operation. The spring pin index automatically locks the spacer arm, insuring accuracy and efficiency.

USE THE COUPON TO GET DETAILED INFORMATION ON THESE SPECIALTIES DEVICES

Please send me full information on SPECIALTIES lathe accessories.

Name_____

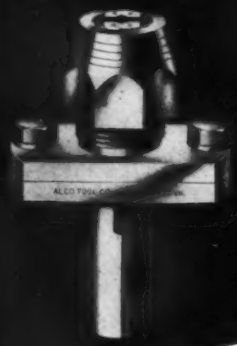
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SPECIALTIES MANUFACTURING COMPANY, INC.
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FOR AUTOMATICS



ALCO TAP HOLDERS
Help Tool Conservation

★

ALCO
TAP HOLDERS



RELEASING MODEL
FOR HAND SCREW MACHINES
AND TURRET LATHES

Don't just take it for granted that tap breakage is a necessary evil. If you use ALCO Tap Holders you can reduce your breakage to a minimum and at the same time increase production and reduce set-up time.

No all out effort can be made to reach top production from your taps unless the tap and the hole are in perfect alignment. ALCO Tap Holders accomplish this absolute concentricity through the application of the patented floating feature of this precision built tool.

You won't need bushings and you can deliver more perfectly threaded pieces for the assembly room.

Send for new catalog No. 4.

ALCO TOOLS

THE ALCO TOOL CO.
252 Birdseye St., Bridgeport, Conn.
Detroit Office: 908 Stephenson Bldg.

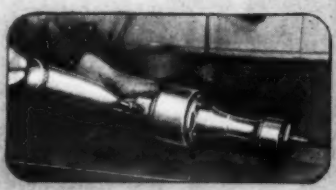
Pneumatic Grinders Get Gruelling Service



—PREVENTIVE MAINTENANCE IS IMPORTANT

In shipyards, steel mills, foundries and other industries, CP Pneumatic Grinders are getting tough usage, and practically continuous service. Like any well-built tools, they deserve simple, preventive care. Grease and oil them at regular intervals . . . keep nuts tight . . . clean air strainers . . . blow air lines free of moisture and dirt. If these simple precautions are taken regularly, CP Pneumatic Grinder maintenance will be kept to a minimum.

HOW TO GET MAXIMUM SERVICE FROM CP PNEUMATIC GRINDERS



Lubricate governor, upper bearing weekly. Clean out, renew grease every three months.



Grease the spindle bearing weekly. Clean out and renew grease every three months.



On each shift, fill the oil reservoir with 200 viscosity oil to lubricate the motor.



Check all nuts — on all portable tools — at regular intervals. Be sure they are tight.

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THAT'S what they're saying in modern tool rooms, die and mold shops and production plants. Wherever output **with precision** looms big, the stamina of the Cleveland No. 1 Vertical Milling Machine counts heavily. Typical features:

① Big, husky spindle of chrome nickel steel heat-treated and mounted on 200-lb. pre-loaded precision bearings.

② All lead screws and feed gears mounted on Timken bearings.

③ Hand wheel and lead screw on spindle head for quick shifting of belts for changes of spindle speeds.

④ Also 3 speed changes on back gears, giving 12 speeds in all.

⑤ Feed box driven by ⅓ h.p. motor through V-belt with 3 speed changes on pulleys and 4 in gear box; 12 feeds in all to table.

⑥ Longitudinal feed, 18"; cross travel, 8½"; vertical travel, 16". Spindle speeds — 100 r.p.m. to 1800 r.p.m.

The Cleveland No. 1 is fast, powerful, rugged, accurate. Designed to fill a real, expressed need, it has handsomely fulfilled expectations. **Satisfactory deliveries now.**

S&A

THE SOMMER & ADAMS COMPANY

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Custom-Built EQUIPMENT FOR MANY PURPOSES



Heat Treat Your Own Small Parts...

SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

1. Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
2. Saves time and expense of drawing or tempering small metal parts in large furnaces.
3. Cuts handling time when normalizing or annealing small parts. No waiting.
4. Conveniently available for pre-heating for subsequent high-speed hardening.
5. Eliminates shut downs and delays in servicing emergency repair orders.

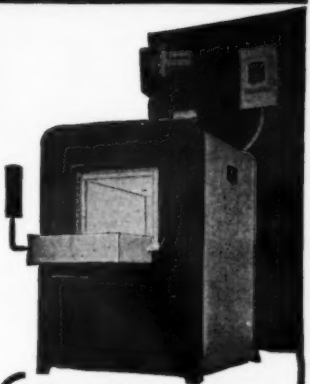
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Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
MH-3	8″W 6″H 14″L	29.6	3400	14.8	$124.00*
MH-4	10″W 6″H 18″L	....	4800	20.9	$191.00*

**Includes Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$152.40.



REPLACEABLE HEATING ELEMENTS—Replaceable nickel chromium resistors embedded in rectangular refactory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

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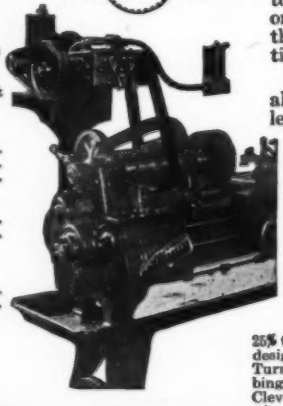


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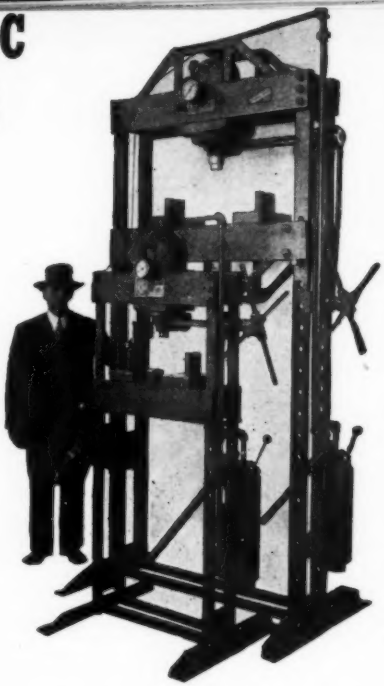
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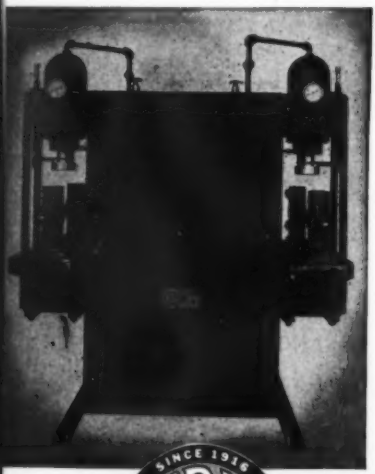
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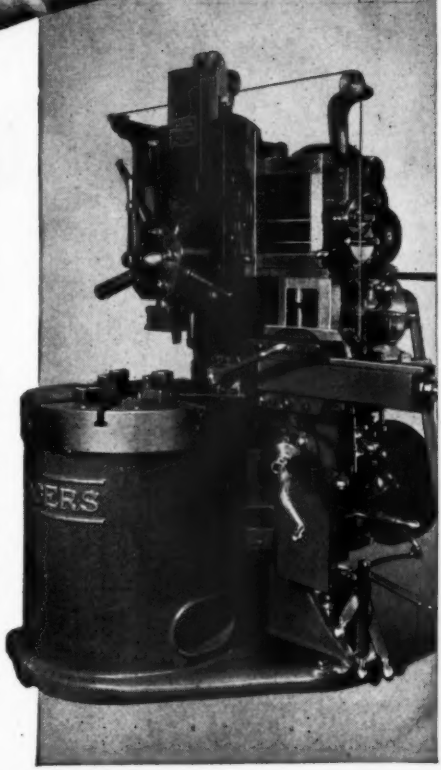
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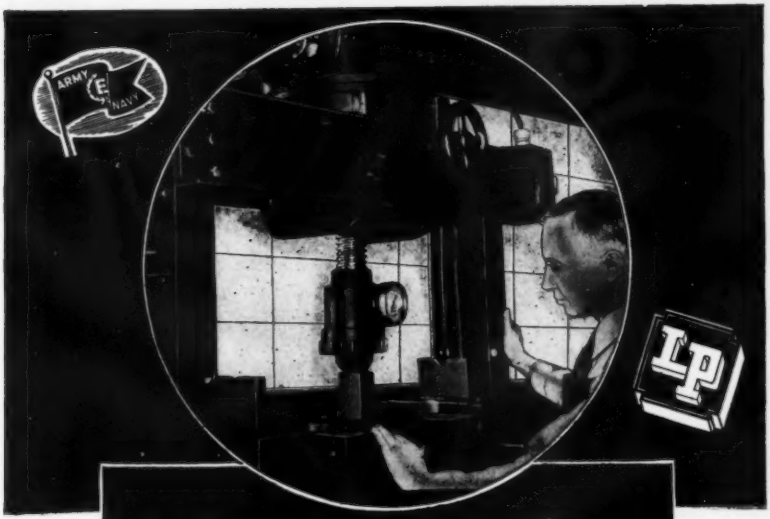
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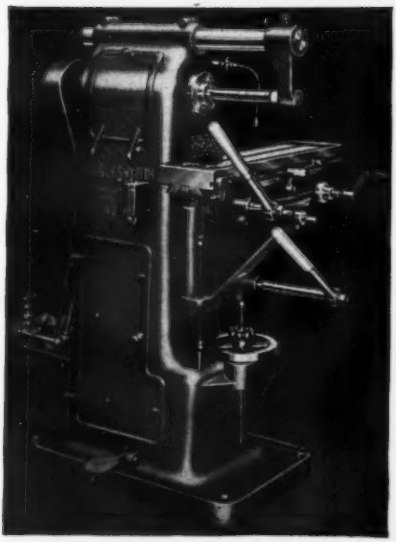
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	222	1/4	3/8	1/2	3	2.20
	226	5/16	3/8	9/16	3	2.20
	232	3/8	3/8	3/4	3 1/4	2.20
	133	7/16	1/2	13/16	3 7/8	2.80
	241	1/2	1/2	1-3/16	4 1/2	3.00
	243	1/2	1/2	13/16	3 7/8	2.80
	246	5/8	5/8	1 1/8	4 1/2	3.44
	250	3/4	3/4	1-5/16	5	4.20
4 FLUTE • DOUBLE END	215	3/16	3/8	1/2	3	2.20
	221	1/4	3/8	5/8	3 3/8	2.20
	223	5/16	3/8	3/4	3 3/8	2.20
	231	3/8	3/8	3/4	3 1/4	2.20
	233	7/16	1/2	1	4 1/4	2.80
	240	1/2	1/2	1	4 1/4	2.80
	247	5/8	5/8	1 3/8	5	3.44
	254	3/4	3/4	1 5/8	5 5/8	4.20

Also 2-Flute and 4-Flute Single-End and 4-Flute Single-End Extra Long Quantities in stock subject to prior sale

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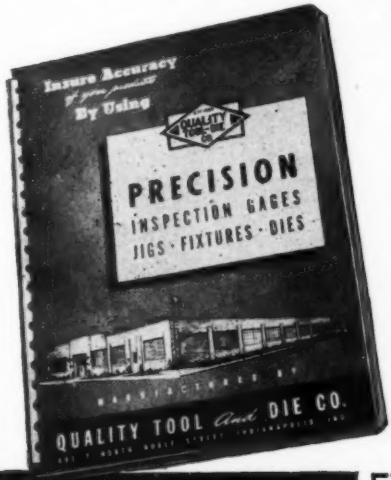
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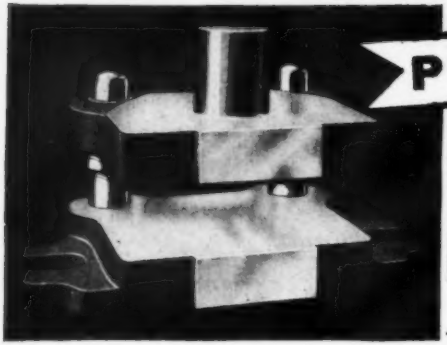
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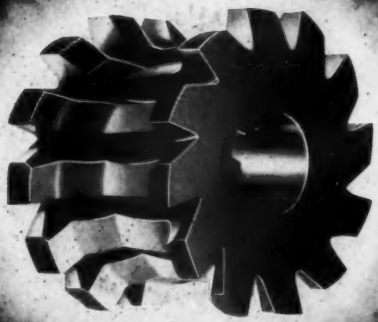
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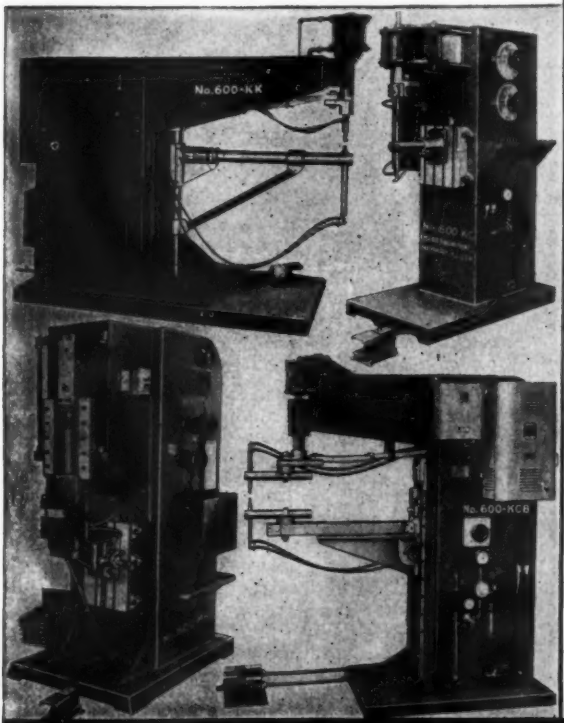
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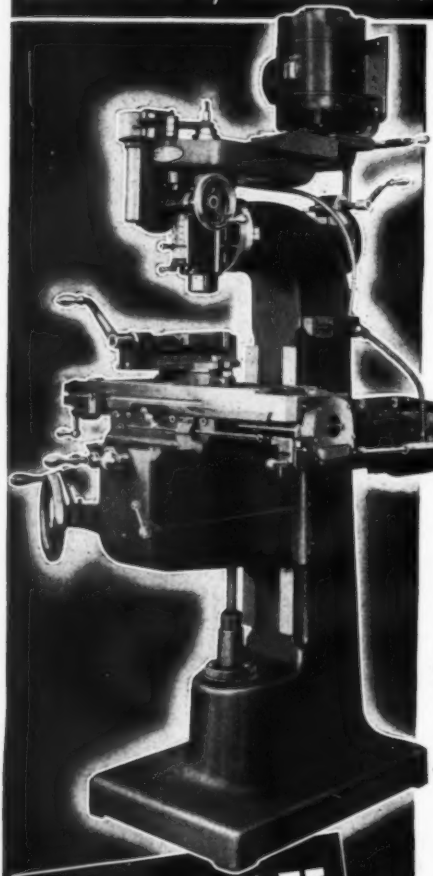
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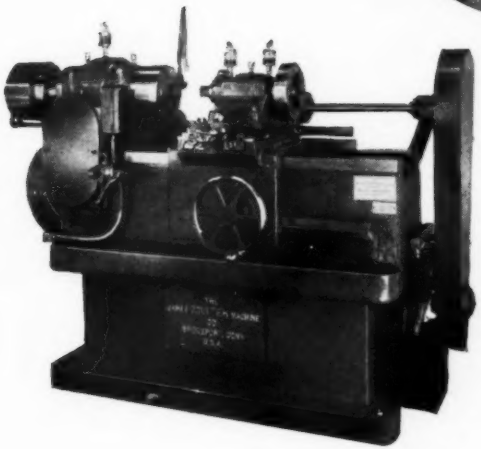
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2850 Rochester Road

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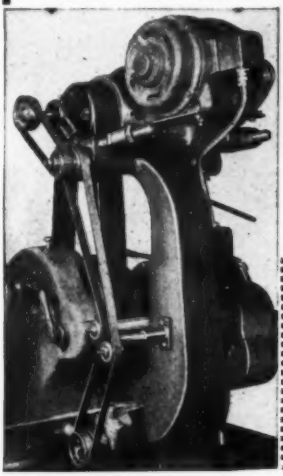
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V-Belt **Helical Gear** **Transmission**

BERKELEY EQUIPMENT COMPANY

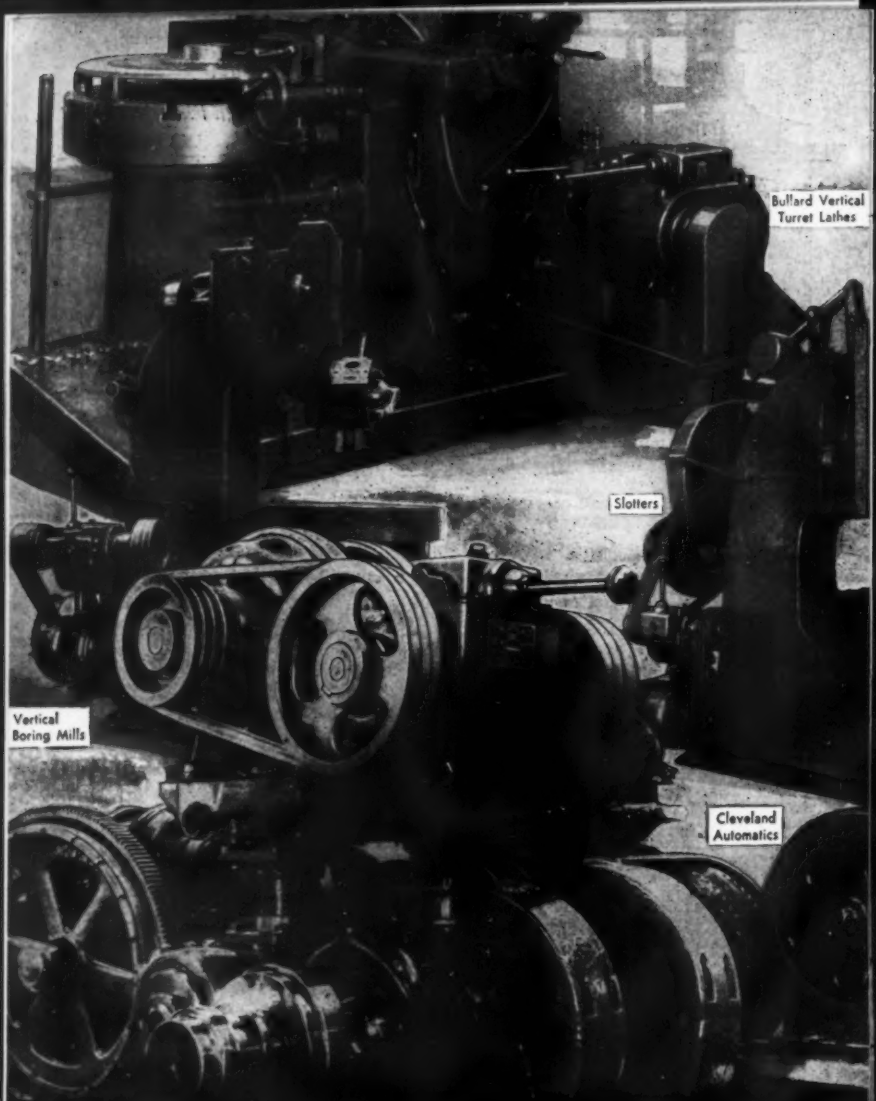
(Formerly located at Corry, Pa.)

New Plant and Office: **1022 Bahls Street, Danville, Illinois**

Berkeley Equipment Company
1022 Bahls Street, Danville, Ill.

You may send us your fact-folder (no obligation, of course) on how Berkeley power drives are increasing machine tool production.

Company .....
Executive .....
Address .....
City ..... **State**.....



up to 30 h. p.

For Motorizing Lathes, Milling Machines, Shapers, Turret Lathes, Radial Drills, Slotters, Bolt Cutters, Gear Cutters, Die Sinkers, Boring Mills, etc.

WESTERN TRANSMISSIONS

WESTERN MANUFACTURING CO. — 3400 SCOTTEN — DETROIT, MICHIGAN

EVERY AMERICAN TOOL HOLDER HOLDS

3 BIT SIZES IN 4 POSITIONS



Each of the four sizes of American Tool Holders will hold three sizes of bits in four positions. This range meets all requirements of tool room lathes on light, precision cuts. American Holders have a wide, positive grip which prevents tool breakage and enhances the accuracy of the lathe itself. The line drawing illustrates the four positions — all available in a few seconds by loosening and tightening a single bolt.

Please send complete information on the four standard sizes of American Tool Holders.

NAME..... TITLE.....

COMPANY.....

STREET .....

CITY..... STATE.....

H.

EDWARD BLAKE COMPANY

634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

BLAKE TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS — L & D HIGH SPEED DRILL PRESSES

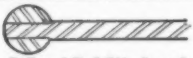
New "STANDARD" HYDRO-FORMER

SHAPES AND JOINS METALS WITHOUT CUTTING . . .

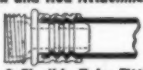
TYPICAL APPLICATIONS



Tube Attachment to Solid Fitting



Ball and Rod Attachment



Hose & Flexible Tube Fittings



Metal Forms from Solid Bars



Union of Tubes



Cable Attachment and Electrical Terminals

In one operation, this machine connects tubing or cables to solid fittings, or forms metal sections from solid bars without cutting. A feature of its design is the use of hydraulically-operated wedges to compress the dies so that swaging force is applied at right angles to the work . . . not obliquely as with tapered dies. In reducing outside diameter of tubing, therefore, tendency toward elongation is lessened and thickness of tubing wall is increased. Fittings having large ends can be put into machine without removing dies. This machine simplifies handling of many other operations which previously required more complex, time-consuming methods.



Load and unload position, wedges withdrawn and dies apart.

Saves

TIME,
LABOR,
METAL

Further information on request.

STANDARD MACHINERY CO.
PROVIDENCE RHODE ISLAND

TIME-SAVING SHOP ACCESSORIES

BENCH CENTERS



Accurate . . . Rigid . . . Compact . . . Portable

Sundstrand Bench Centers provide a faster, more accurate means for precise checking of work between centers. These tools can be placed on a bench, or stand, convenient to the work. Heads are adjustable, locked by lever-clamp gibs. Available in 7 sizes ranging from 6″ x 18″ to 12″ x 72″.

SUNDSTRAND MACHINE TOOL CO.
2535 Eleventh St., Rockford, Ill., U. S. A.

MANUAL INDEX BASES



Increases Machine Output

Sundstrand Index Bases get more production on milling and other operations by saving machining time and reducing work-handling. Available in six standard sizes, Sundstrand Bases speed duplicate operations by using two or more fixtures so that work can be changed at one station while machining progresses at another. For additional information write for free Index Base Bulletin No. 1B.

SUNDSTRAND MACHINE TOOL CO.
2535 Eleventh St., Rockford, Ill., U. S. A.

BALANCING TOOLS

For Faster, Accurate Balancing of Gears, Shafts, Pulleys, Flywheels, etc.



These sensitive, durable Sundstrand Balancing Tools speed up balancing and trueing of gears, shafts, pulleys and similar parts. They are available in 8 sizes and types, ranging from the small Supersensitive Bench Type to the No. 5 Heavy-Duty 12-ton capacity. With the exception of the No. 5 Model, these tools are portable.

SUNDSTRAND MACHINE TOOL CO.
2535 Eleventh St., Rockford, Ill., U. S. A.

FREE BULLETIN



Distinctive features and full details, including capacities and weights, of Sundstrand Bench Centers and Balancing Tools are described in Bulletin SBT-436. Write for your free copy today.

SUNDSTRAND MACHINE TOOL CO.
2535 Eleventh St., Rockford, Ill., U. S. A.

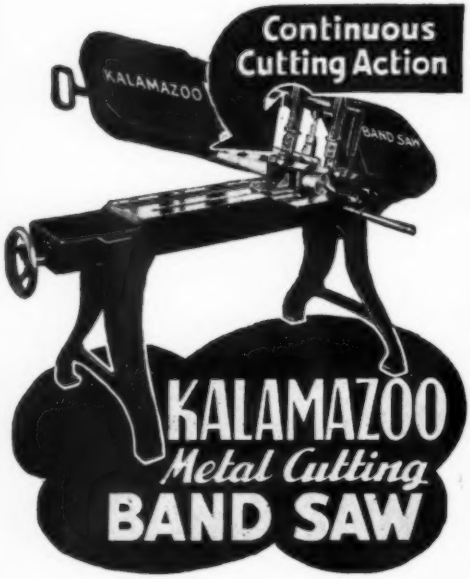
DEALERS

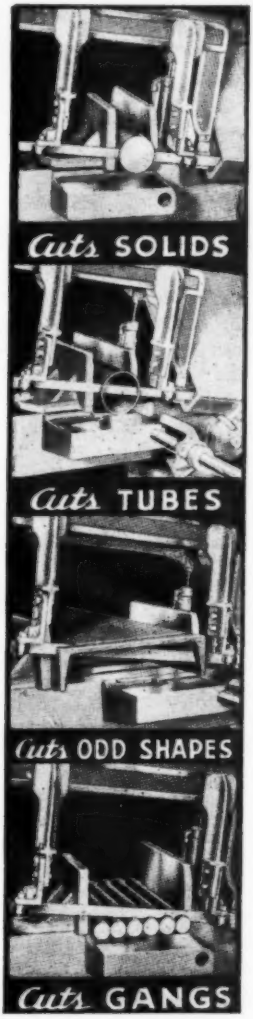
Boost Sales With These Sundstrand Open-Line Tools

Shops everywhere need Sundstrand "Open-Line" Tools, including Bench Centers, Balancing Tools, and Manual Index Bases, to save valuable man-hours. Alert dealers can serve customers better and increase profitable sales, by selling these high-grade shop accessories. Complete information and prices sent on request.

SUNDSTRAND MACHINE TOOL CO.
2535 Eleventh St., Rockford, Ill., U. S. A.

NO LOST MOTION ON CUT-OFF WORK ★





The most modern and fastest known method for handling 95 per cent of all cut-off work. *Faster,* as the cutting action is continuous—no heat generation—no inertia to overcome. *More Accurate,* as it makes a wafer thin cut—smoothly and silently.

Quicker set-up — smaller investment — with SAVINGS in labor — power — and tool steel.

Two sizes—four speeds—portable—attaches to any light socket. Write for bulletin.

MACHINE TOOL DIVISION

KALAMAZOO TANK & SILO CO.
KALAMAZOO, MICH.

The ROBBINS SINE-PLATE

For Angular Inspection to GAGE BLOCK LIMITS



The most accurate and dependable instrument for checking angular surfaces is the Robbins Sine-Plate. Standard gage blocks are used to set the plate to the required angle. This makes the set-up extremely accurate.

The Robbins Sine-Plate is made with the same accuracy and fine workmanship that have made the Robbins Magna Sine Magnetic Chuck known thruout the world. Since many of the same standard parts are used in both of these precision tools any necessary replacement can be made quickly and at low cost.

The Robbins Sine-Plate is available in two sizes in both single and compound angle models. Increased production has made the delivery situation exceptionally good. Write today for full details.

ROBBINS ENGINEERING COMPANY

318 MIDLAND AVENUE • DETROIT, MICHIGAN

CANEDY-OTTO
RADIAL DRILLS

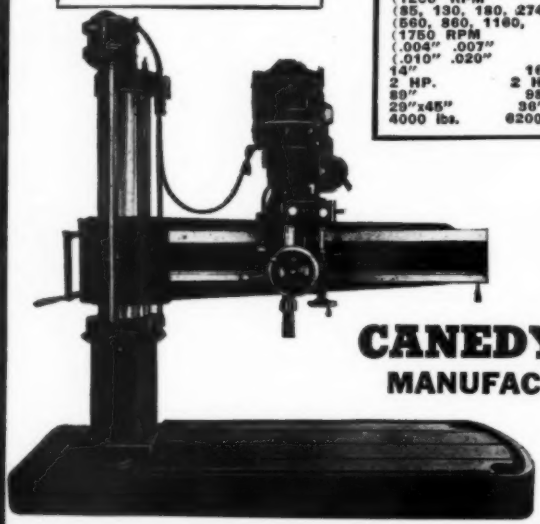
Canedy-Otto has been the manufacturer of first-class, high-grade drilling units since 1892. These units are available in single spindle, multiple spindle and radial.

We can help you solve your drilling problems. Send for information on our complete line.

SPECIFICATIONS:

	9" Column 3' Arm	11" Column 4' Arm	11" Column 5' Arm
Drills to the center of circle on base or table	73½"	96"	120"
Length of arm	3'	4'	5'
Greatest distance from spindle to base	43½"	48"	48"
Minimum distance from spindle to base	9½"	15"	17"
Minimum distance from spindle to column	10½"	10"	10"
Traverse of spindle	9½"	12½"	9½"
Hole in spindle—Morse Taper	No. 4	No. 4	No. 4
Diameter of spindle at nose	2½"	2½"	2½"
Traverse of head on arm	25½"	36½"	48½"
Traverse of arm on column	21½"	24"	22"
Spindle speeds with 1200 RPM motor	(60, 85, 130, 180,		on all models
	(425, 560, 860,		
	(1200 RPM		
Spindle speeds with 1800 RPM motor	(85, 130, 180, 274,		on all models
	(560, 860, 1160,		
	(1750 RPM		
Feeds per revolution of spindle	(.004" .007"		on all models
	(.010" .020"		
Bearing of arm on column	14"	16"	18"
Size of main driving motor	2 HP.	2 HP.	2 HP.
Height of drill column over gears	89"	98"	98"
Working Surface of Base	29"x45"	36"x60"	30"x88"
Net weight	4000 lbs.	6200 lbs.	7000 lbs.

USED THE WORLD OVER



EARLY DELIVERY POSSIBLE

CANEDY-OTTO MANUFACTURING CO.

CHICAGO HEIGHTS, ILLINOIS

More production per worker!



FOOT CONTROL LEAVES BOTH HANDS FREE TO WORK!

Features: *Vise opens and closes instantly . . . Remains open or closed without constant foot pressure . . . Exerts grip of 15 times air-line pressure . . . Measures 12 x 6 ½ x 6 in. . . . Jaw width 3 in. . . . Jaw depth 2 in. . . . Maximum opening 3 in. . . . Maximum travel ½ in. Attaches to air line or individual compressor.*

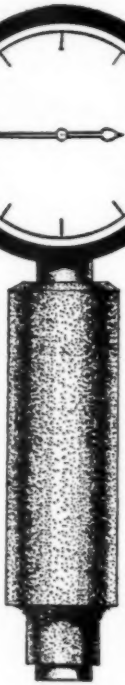
SPEEDY AIR VISE
complete with Foot Control Valve, Air Hose and Fittings . . **$24**

Want more production? Follow the example of leading war plants — put *Speedy Air Vises* to work! This foot-controlled, pneumatic vise leaves operator's both hands free for safe, fast insertion and removal of work. You'll find it cuts time, labor and costs, reduces fatigue. Sturdy, compact, precision-built . . . so low in price it can be economically used on every drill-press, miller, filer and assembly line. Prompt delivery. Ask your distributor or write for details.

W. R. BROWN CORP. 5724 ARMITAGE AVE. CHICAGO, ILL.

AMERICA'S MOST TALKED-ABOUT VISE . . . AT A PRICE!

TRITON



The fundamental basis of all war production is precision and speed.

Substitute your flush pin gauges, snap height gauges, etc. for special dial indicator gauges. They are:

MANY TIMES FASTER IN OPERATION.

NEVER WEAR OUT.

MAKE NO MISTAKES IN READING.

We will design special dial indicator gauges to meet your requirements.

Write and tell us your problem—we might have the solution.

SPECIAL TOOLS
RING GAUGES
PLUG GAUGES
SNAP GAUGES
AND SPECIAL GAUGES

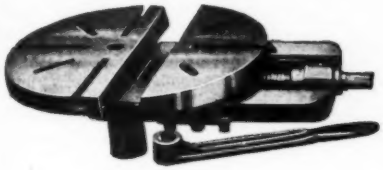
PROMPT DELIVERIES

TRITON PRECISION CORP.
GAGE AND TOOL MANUFACTURERS

1302 INWOOD AVE. N.Y.C.

Use the COMBINATION

DRILL TABLE and VISE



SPEEDS DRILL PRESS SET-UPS

Simplifies the most difficult set-ups. Holds work of all shapes securely, without angle plates, clamps or supports. Just drop in the work and start to drill.

The Combination is made in various sizes — diameters from 8" to 27½", weighing from 27 to 600 lbs. Made of the finest materials, for long life. Easy to install. Specify shank diameter in thousandths of an inch. We supply the drill table and vise with shank turned to size specified.



GUARANTEE

We guarantee the Combination will save its cost in labor alone in six months. You are the judge.

FREE TRIAL

We will ship to rated concerns under this guarantee, on free trial. Should you decide not to keep the tool we will even pay return transportation. Order Today!

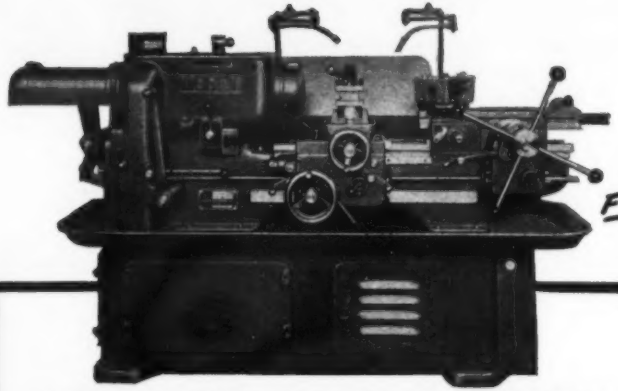
Circular on Request.

WRITE TODAY FOR CIRCULAR

Gives full information and illustrates typical, set-ups. Shows use on radial drills. Complete specifications of all models including the square, all steel tables.

MODERN MACHINE TOOL CO.

Jackson, Michigan



MOREY DESIGNED AND BUILT
FOR PRECISION *PLUS* PRODUCTION

TURRET LATHES FOR BAR OR CHUCKING WORK

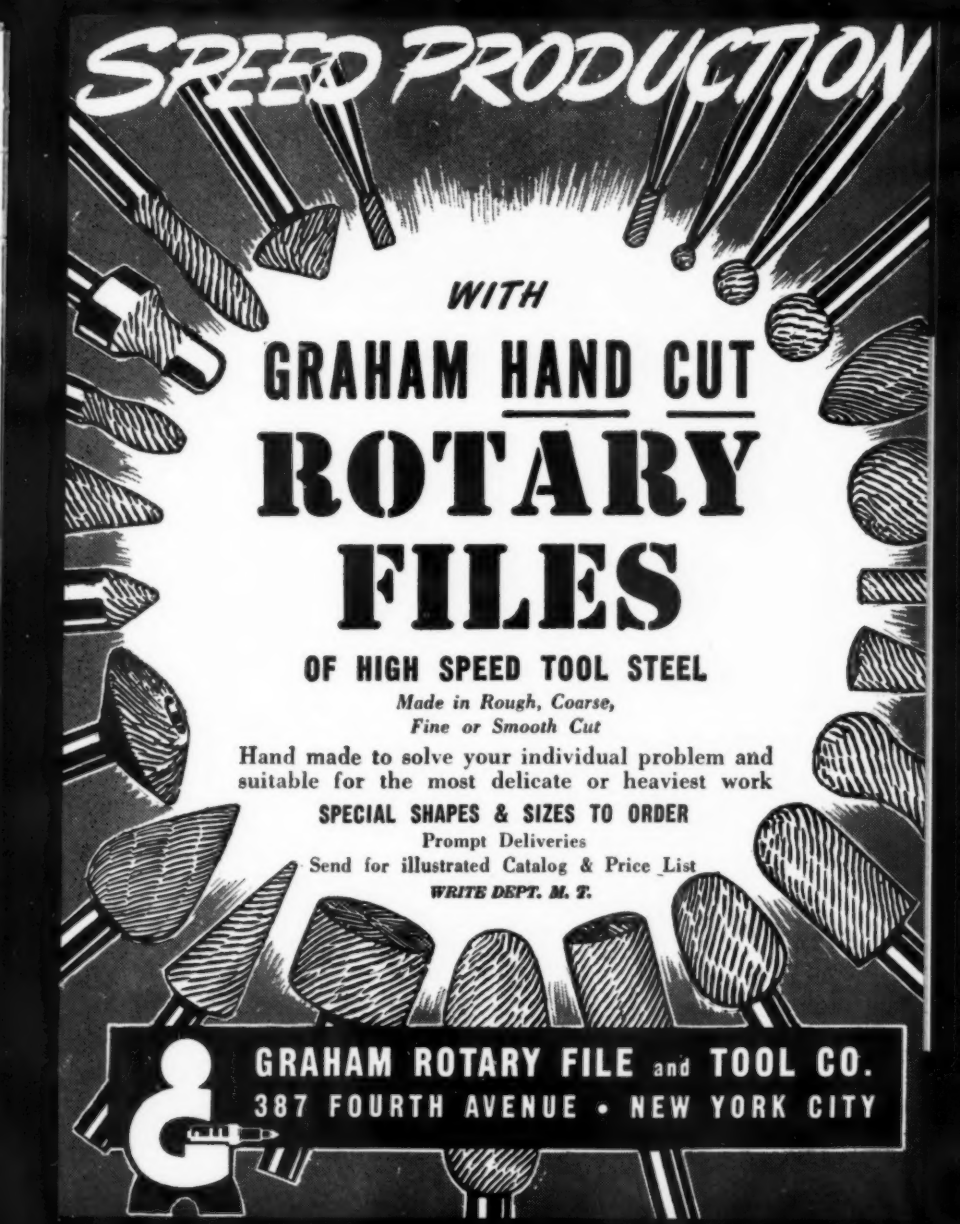
Infinite spindle speeds . . . Multiple disc clutch . . . Power feeds for the turret and cross slide . . . 8 feed changes available . . . Timken bearing . . . Self-locking turret . . . Automatic stops . . . Turret clamps and unclamps automatically . . . Independent adjustable stop for each turret face.

No. 2 TURRET LATHE
1" hole in spindle, 6" turning length, 14" swing over bed. Infinite spindle speeds 60 to 2000 RPM, constant speed motor, 1800 RPM.
Ask for Circular No. 629A

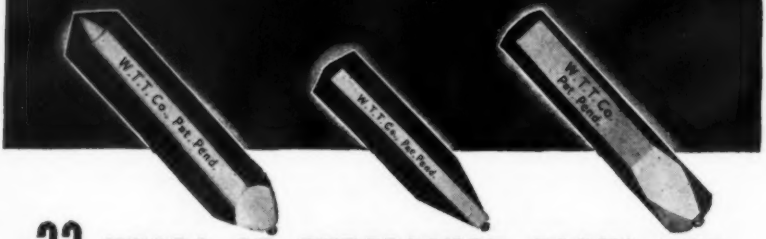
No. 3 TURRET LATHE
1½" hole in spindle, 10" turning length, 16½" swing over bed. Infinite spindle speeds 55 to 1800 RPM, constant speed motor, 1200 RPM.
Ask for Circular No. 727A

No. 4 TURRET LATHE
2" hole in spindle, 12" turning length, 19½" swing over bed. Infinite spindle speeds 35 to 1500 RPM, constant speed motor, 1200 RPM.
Ask for Circular No. 736A

MOREY MACHINERY CO., INC
410 Broome Street New York, N. Y.


SREED PRODUCTION
WITH
GRAHAM HAND CUT
ROTARY
FILES
OF HIGH SPEED TOOL STEEL
Made in Rough, Coarse,
Fine or Smooth Cut
Hand made to solve your individual problem and
suitable for the most delicate or heaviest work
SPECIAL SHAPES & SIZES TO ORDER
Prompt Deliveries
Send for illustrated Catalog & Price List
WRITE DEPT. M. T.
GRAHAM ROTARY FILE and TOOL CO.
387 FOURTH AVENUE • NEW YORK CITY

EXPERIENCE *is a Great Teacher!*



33 YEARS OF EXPERIENCE BACKS THE DEVELOPMENT OF THIS NEW TYPE THREAD GRINDING DIAMOND TOOL!

Here is a new type wheel dressing diamond tool that brings new standards of performance and economy to your thread grinding operations.

For Use On
EX-CELL-O
JONES & LAMSON
DALZEN
And Other Thread Grinders.

For Forming Wheels That Grind
WHITWORTH
BUTTRESS
ACME
And Any Other Special Form, Groove or Standard Thread.

It gives better performance because it utilizes the hard characteristics of the natural uncut diamond —and yet it is of a shape that permits not only straight dressing but angle, radial and multiple form dressing as well.

It gives greater economy because its cleaner cuts mean forms are obtained quicker and hold longer—fewer dressings are needed—more work can be ground between dressings—down time is greatly reduced—and because this precision tool can be made and reserviced on a production basis, quicker deliveries are assured.

And your assurance of satisfaction is the knowledge that back of this new type thread grinding diamond tool is the experience gained by a manufacturer who has spent the past 33 years building diamond tools of fine quality.

Try it and you'll agree... *there is no substitute for experience!*

Available ONLY from

WHEEL TRUEING TOOL COMPANY

3200 W. DAVISON DETROIT, MICHIGAN

The Glenco -

COMPENSATING TOOL HOLDER



Produces true and accurate holes by correcting machine tool misalignment on screw machines, automatic screw machines, tapping and drilling machines of all kinds, and multiple spindles.

Available in stock are five standard sizes of holders with taper or straight shanks, with capacity up to 5" tool diameters. Prompt make-ups on larger or special holders are easily accomplished and our engineers are ready at all times to assist you in solving your special problems.

SEND FOR BULLETINS ON ALL OUR UTILITY TOOLS

THE J. C. GLENZER COMPANY, INC.

6465 EPWORTH BLVD. - DETROIT, MICH.

SUNNEN HONING Provides a finish of 2 to 3 micro-inches—

and at a Saving of 35% in time!



Battery of 6 Sunnen Precision Honing Machines in completely air-conditioned room — honing to .0001" tolerance.



Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.



Saved time in producing a smooth, accurate finish on this bronze remote control valve body.



Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .000015 apk."



Aircraft Valve Tappet Roller. 4-Micro finish.



Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



"Strict alignment maintained between two holes."



The coveted Army-Navy "E" waves over the Sunnen plant—evidence of the important part Sunnen equipment is playing in the war effort.

Accuracy — and a super-smooth finish with a real increase in production which means a saving in cost. That's the record of the Sunnen "MA" Precision Honing Machine in the modern plant of the Fidelity Machine Company.

Consider These Advantages

Wide range—handles internal diameters of .185" to 2.625". Accuracy within "one-tenth" guaranteed — has been held to .000025" on production jobs. Relieves big internal grinders for other jobs. Corrects errors of out-of-roundness or taper caused by previous operations. Facilitates duplication of sizes. Does not require skilled labor. Practical — inexpensive — economical to operate.

Put Sunnen Honing to work in your plant!

SUNNEN

SUNNEN PRODUCTS COMPANY — 7935 Manchester Avenue, St. Louis, Missouri

Canadian Factory: Chatham, Ontario

THE PART DOES NOT *Revolve!*



In plan-o-milling, all motion is confined to the milling head. Whether the job be one of external or internal threading, or cylindrical forming, *the part itself does not revolve!* The advantages of this method are obvious.

Large, cumbersome pieces are machined easily and accurately. The heavy, rigid fixture absorbs vibration. Operating the Plan-O-Mill is a simple matter of loading the part and pushing a button.



Plan-O-Mill's automatic feed cycle affords complete control of feed-in and feed-around, for maximum cutter life together with maximum production. If you have not already received your free copies of the two Plan-O-Mill booklets, which clearly explain this remarkably efficient milling principle, write or call your nearest representative.

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MILLING MACHINES
PLAN-O-MILL
MILLING CUTTERS

TO KNOW YOU'RE RIGHT

use MILLERS FALLS Precision Tools

TO MEET constant demand, Millers Falls micrometer production has been increased several hundred per cent during this war. Typical Millers Falls quality, these are high-precision tools; now used largely in the manufacture and repair of war goods, they'll also be needed in huge quantities for production and maintenance in the mechanized world of tomorrow. Plan now to "tool up" with Millers Falls *quality* micrometers.





THERE ARE 64 kinds and sizes of Millers Falls calipers and dividers — 3 to 12 inches, inside, outside, and hermaphrodite. All are designed to meet the most exacting requirements of skilled machinists and toolmakers. Made of crucible steel, with rounded edges, hardened, ground, and polished. Many features for accuracy, rigidity, and convenience.

Millers Falls' 75 years of toolmaking "know-how" shows in these *quality* tools.





DESIGNED to make accurate depth measurements of holes, slots, shoulders, and projections, the Millers Falls Depth Gauge is a rugged, precise shop tool. Spindle movement one inch, capacity 0 to 3" by .001"; capacity may be increased up to 12 inches with Millers Falls hardened and precision-ground extension rods. Several special features insure accuracy and long wear — standard Millers Falls *extra* quality.

MILLERS FALLS TOOLS

SINCE 1868

MILLERS FALLS CO.

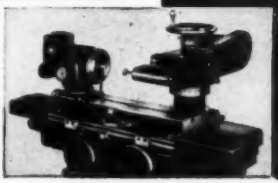
Greenfield, Mass., U. S. A.



SQUEEZE PLAY on TOLERANCE

THE New Vernon Universal Tool and Cutter Grinder is helping manufacturers everywhere put the squeeze on tolerance . . . to hold ultra-precision accuracy on production work as well as tool and cutter work . . . to obtain the *most production* for the least investment in a tool *especially engineered for use with coolant!*

This Vernon's pedestal is designed to contain a Vernon Pump and Coolant Reservoir. The grinder's ways are carefully guarded against splash and abrasives, coolant return systems are provided, and full coolant equipment is available as a standard Vernon extra.



To get the most from grinding, use a coolant . . . to get the most from grinders—choose a Vernon!

MACHINERY MANUFACTURING COMPANY

1915 EAST 51 ST. VERNON LOS ANGELES CALIFORNIA

Vernon Line of **HORIZONTAL MILLS, VERTICAL MILLS and JIG BORERS, SHAPERS and GRINDERS**



2/1,296,000ths!

EXACTLY! Two-onemilliontwohundredandninetysixthousandths part of a circle! THAT'S SMALL, ISN'T IT? That is only TWO SECONDS OF ARC! That would be, let's see—mmmm—less than .0006" on the circumference of a circle 10 feet in diameter . . . less than 1/3 of an inch on a circumference of MORE THAN THREE MILES!

What does it mean? Why, that is the amount of error that creeps in on the VINCO OPTICAL MASTER INSPECTION DIVIDING HEAD'S accuracy. Sometimes it is even less!

Today, most of the great producers of armament in America are using the VINCO DIVIDING HEAD to check gears, index plates, splines, cams, camshafts, etc., to limits that formerly were believed impossible.

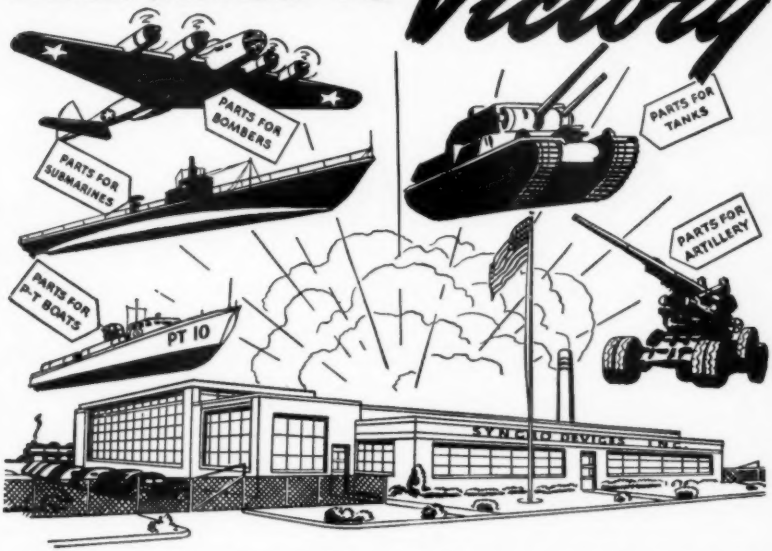
Further information regarding this accurate inspection instrument will be sent upon request.

MILLIONTHS OF AN INCH FOR SALE BY VINCO

VINCO CORPORATION
8859 SCHAEFER HIGHWAY
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SYNCRO

dedicated to Victory



Syncro tools and Syncro craftsmen dedicate themselves to production for Victory . . . in order that freedom of the people, by the people and for the people shall not perish from this earth.

Manufacturing facilities available for development of precision machine tool parts — special tools — fixtures — production parts and plug gauges . . . now and after Victory.

SYNCRO DEVICES *inc.*

3265 BERMUDA AVENUE, DEPT. MT-63 • FERNDALE, MICH.

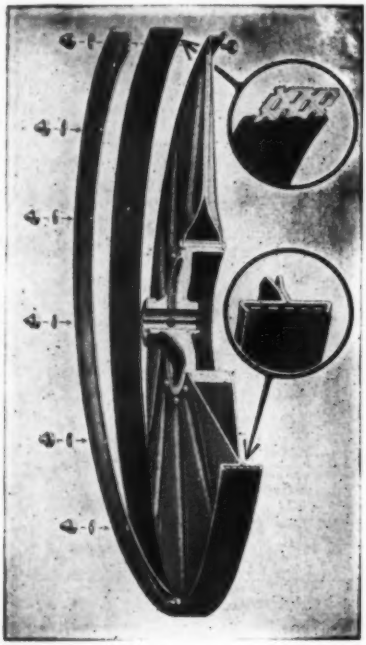
* *Established Nineteen Hundred and Thirty-Two* *

MANUFACTURERS OF PRECISION MACHINE TOOL PRODUCTS

Save Material and Speed Production of

PLASTIC, METAL & WOOD "WAR GOODS"

with CARTER Rigid Band Saw Wheels and Quick-Change Tires



Change Tires in

10 TO 15 MINUTES

Without Removing Wheel or Using Special Tools!

Assure Accident - Free Super - Speed Operation Up to **1800 RPM.**

PATENTED

Fits Any Band Saw; Saves Machine Time and Labor Costs; Speed Up to 1800 RPM; Uses Less Rubber and Metal; Available Quickly!

Make Any Good Band Saw Better

Most war material engineers now specify Carter Wheels and Tires on new band saws or to modernize old saws because CARTER WHEELS are perfectly balanced and accurately machined, making any saw operate better and continuously under terrific load; and because CARTER TIRES fit with honed precision without using glue, and operate under any climate, weather or shop condition. In addition CARTER TIRES are mechanically molded rubber entirely covering perforated, endless, flat-steel back-bone, thus using less vital rubber and steel.

CARTER PRODUCTS CO., INC.

204 DIVISION AVENUE, NORTH
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- *Also* Maker of the Carter Precision Micro-Guide with renewable and replaceable micrometer-adjusted jaws and quick-replaceable wearing ring.
- *And* Maker of the Carter Guide-Line Light that throws a Black Shadow for Straight-line hand sawing.

WRITE for *BULLETINS!*

THOSE FOREDOMS ARE TOPS FOR DE-BURRING AND OTHER LIGHT PRODUCTION JOBS. WE SPOT 'EM EVERYWHERE FOR EMERGENCIES, TOO



Foredom FLEXIBLE SHAFT MACHINES

- can be used on all metals as well as plastics, porcelain, wood, etc.
- use hundreds of different accessories.
- have 4 types of readily interchangeable handpieces.
- are portable, yet sturdy; easy to handle, yet rugged.
- get into tight corners and irregularly-shaped parts.
- are adaptable to hundreds of regular and emergency uses.

No matter what kind of equipment you have
— no matter what type of work you do —
FOREDOMS CAN BOOST YOUR PRODUCTION!

There's a reason why Ford, Bendix, Westinghouse, Allis-Chalmers, Curtiss Wright and many other war plants are equipped with Foredom Flexible Shaft Machines! Foredoms eliminate many types of old-fashioned, time-consuming hand work and thus speed up production. Foredoms are just as ready to "pinch hit" in emergency breakdowns. Models from $17.50 to $48.75.

Send for Catalog No. 407 and find out how a Foredom can help solve today's production problems in your plant.



Excellent For Use On Irregularly Shaped Parts



Touching Up Production Setups Without Disassembly



In Tool, Die, Mold and Patterns Depts.



Foredom
FLEXIBLE SHAFT MACHINES
SOLVE MANY PRODUCTION AND MAINTENANCE PROBLEMS
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Please send us your new catalog No. 407 showing the different uses of Foredom Flexible Shaft Machines.
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★ ★ ★

On the front lines of production . . . . . Marshalltown Presses have been GETTING THE JOB DONE . . . they are engineered to STEP UP PRODUCTION.

MARSHALLTOWN PRESSES

Features of design include more die space, chrome nickel cranks, wrist pin connections and many other proven advantages.

Get the facts today about Marshalltown Presses. Send for literature of the complete line . . . capacities from 5 to 70 tons.

Marshalltown Mfg. Company

900 Nevada Street, Marshalltown, Iowa

Windermere



Holds Fast!

Properties of the new alloy contained in the Windermere Magnetic Adjustor are such that the magnetic charge in a one-pound magnet will lift twenty or more times its own weight of attracted metal. This power is retained indefinitely by the magnet.

Upright posts, which may be removed, are made of brass and will not expel magnetism to affect the indicator.

By speeding up essential war production through its many applications in set-ups on inspection, lathe, boring mill, shaper, etc., the tremendous saving of time through the elimination of clamps, vises, and special fixtures is incalculable.

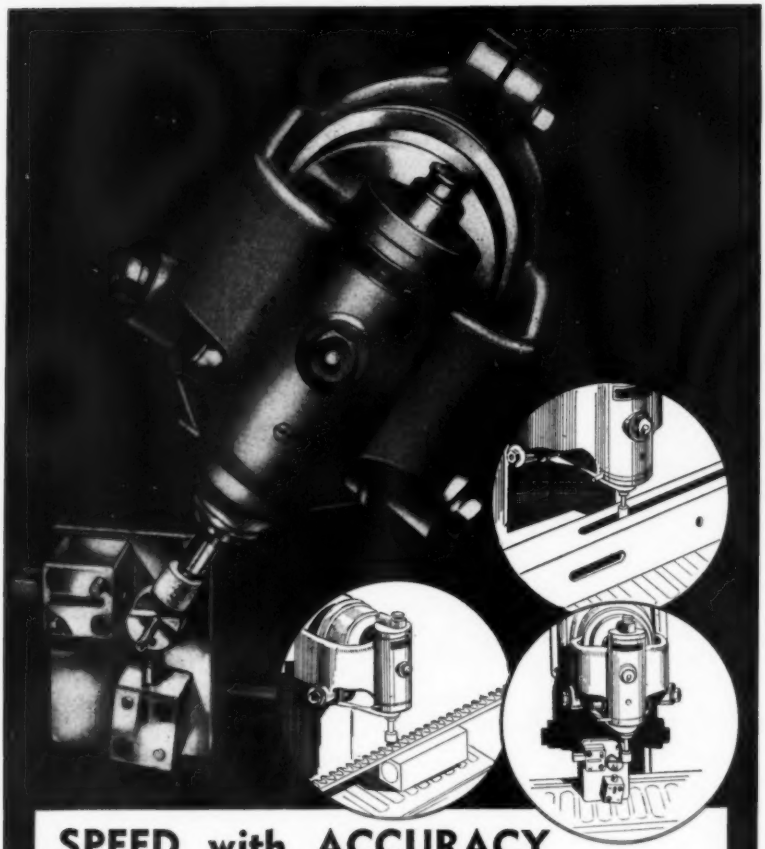
Satisfaction is guaranteed, as attested to by the many thousands in use throughout the essential war plants in America.

COMPLETELY GUARANTEED

Distributed by

CLUTSOM MACHINES, INC.

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SPEED with ACCURACY

Liberty High Speed Attachments are on and off surface grinders in two minutes.

Especially adapted for sharpening broaches and grinding hard to get at surfaces.

Sold with solid quill or collet chuck.

Write for descriptive circular and price list.

LIBERTY TOOL AND GAGE WORKS, INC.

231 Georgia Avenue **Providence, R. I.**

With Plant Facilities for Producing Precision Aircraft Parts

Tomorrow's Tools for Today's Tasks



Your *Industrial Supply Distributor can buy for you on the same Priority that your own Purchasing Department uses.

He buys in big volume—he buys often—he buys just as far ahead of your requirements as he possibly can—to be ready when you call. His purchases cover materials *that he knows you are going to need.*

When your Industrial Supply Distributor's orders hit the factory, they go into the production schedule and they *stay* there. Nothing can "bump" them except a higher priority. Thus when the Distributor's order for *your* materials goes into production ahead, it *stays* ahead.

Build better relationships with *your* Distributor. It's good business—whether you're buying shop tools, Cle-Forge High-Speed Drills and Peerless High-Speed Reamers or a thousand items in between—

***Telephone your Industrial Supply Distributor first!**

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND

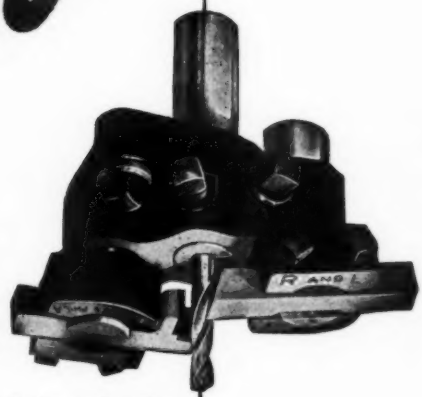
30 RECADE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 600 HOWARD ST. SAN FRANCISCO
6600 SECOND BLVD. DETROIT · LONDON—S. P. ROBBINS, LTD.—20-26 UPPER THAMES ST. E.C.4

CLEVELAND DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

Save

with R and L

Turning Tools



A tool that saves time is a great contribution to the safety of this nation. A tool that saves money is a safeguard against non-profit and loss to your shop. R and L is just such a tool.

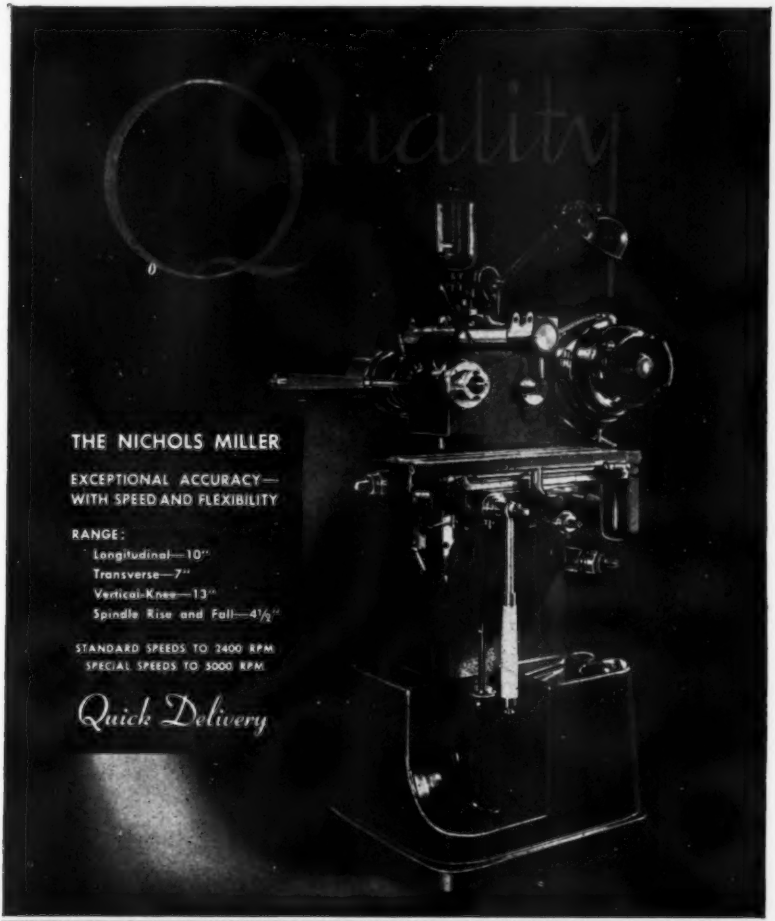
Speed is the keynote of this vast defense production schedule. This Turning Tool increases production by reducing set-up time, by speeding up cutting, by doing right and left hand turning (it requires only ten seconds to change from a right to a left hand turning tool), and by performing several operations simultaneously.

A savings of over $200 is realized on the initial cost alone. R and L costs less than one-fourth of the tool which it replaces (14 in all). And, because they are simply and ruggedly built, they retain their accuracy, thereby saving maintenance costs. It does away with the reconditioning of extra tools when worn, or replacing when lost.

Write for booklet describing this and Tap and Die Holder, Roller Backrest and Universal Tool Post.

R and L Tools

1827 Bristol St,, Nicetown, Phila., Pa.



W. H. NICHOLS & SONS

WALTHAM MASS.

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NICHOLS-MORRIS CORPORATION

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GRINDALL

EXTERNAL GRINDER
INTERNAL GRINDER
MODEL B—6" x 12"

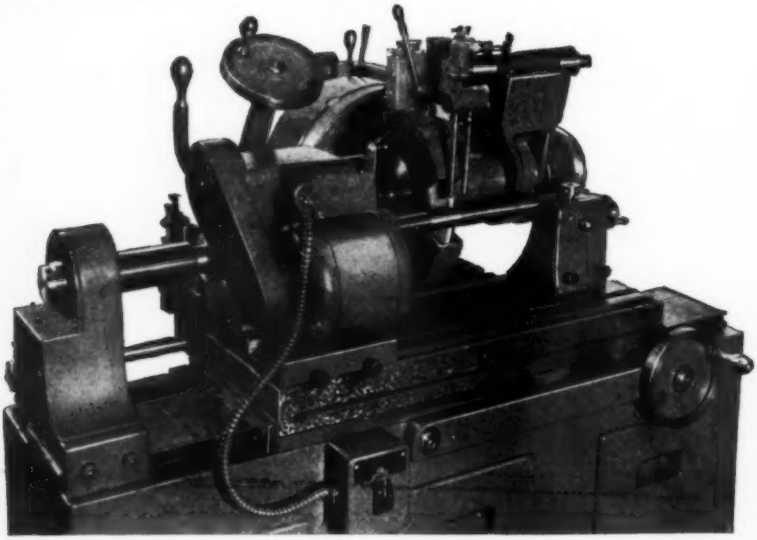
THREAD GRINDER

Tool and Production executives from everywhere, from Maine to California, and from foreign countries have come to our plant to see this thread grinder in operation.

After seeing the accurate work it produces, the simple foolproof and ingenious design and the high rate of production of this thread grinder, they have ordered from one to several machines.

The accuracy of the GRINDALL thread grinder is unsurpassed.

It can be set up for any thread grinding job internal or external in ten minutes. It is simple in design and operation and anyone who can measure accurately can learn to operate the machine and be thoroughly familiar with it in a few hours.



GENERAL MACHINE TOOL CO.
REPRESENTATIVES IN ALL PRINCIPAL CITIES

SENECA FALLS, NEW YORK

VITAL! Release Larger, Expensive Machines for Other Work



Typical of operations suitable for Hammond Belt Grinders.

Hammond ABRASIVE BELT GRINDER

Women operators now handle jobs easier, faster and more economically on HAMMOND Abrasive Belt Grinders. Many parts are done by hand which formerly required costly set-up time on expensive machines. There are a dozen grinding, burring, finning or surfacing jobs in your plant right now waiting to be done on this machine. Write for Bulletin Number 7.



New Features:

HAMMOND's 600 WET-N-DRY machine uses 6" belts. Its new heavy cast base and dynamically balanced spindle and idler-pulley insures smooth, vibrationless operation.

HAMMOND Carbide, Tool and Snagging Grinders • Abrasive Belt Surfacers • Automatic and OD Cylindrical Finishing Machines • Polishing Lathes

Hammond Machinery Builders INC.
KALAMAZOO, MICHIGAN

1614 DOUGLAS AVENUE
Eastern Branch - 71 West 23rd Street, New York, N. Y.

Special

LIVE CENTER SET-UP REDUCES SCRAP



Battery of Ex-Cell-O Thread Grinders Involved in Operation.

on vital aircraft engine part



Operator at N. A. Woodworth Company, Ferndale, Michigan, putting another part on specially designed Sturdimatic Live Center.

They had trouble with **dead centers,** during a precision grinding operation at N. A. Woodworth Co., because of deep scratching. Emery, in the coolant, was getting between dead centers and a highly polished spherical radius hole, in the part, that was used for support between centers. . . . We designed a special STURDIMATIC LIVE CENTER which, revolving with the part, stopped all movement between the highly polished concentric surface and the center, eliminating the trouble at the source — without any rubbing action, the emery in the coolant had no bad effect. . . Scrap had been running high — threads had to be ground concentric with the spherical radius hole within very close tolerances and production of thousands per day had to be maintained. So here a substantial saving on a vital war part was accomplished by using a STURDIMATIC LIVE CENTER. . . . ***standard shanks with Morse taper carried in stock . . . send for catalog.***

STURDIMATIC **TOOL COMPANY**
5224 THIRD AVE., DETROIT, MICH.
LIVE CENTERS



Don't LET YOUR GUNS JAM *Now*



Every air tool in your plant is a gun on America's production front. Don't let wear and corrosion jam a single gun!

NORGREN (air-line) LUBRICATION checks wear during use—stops destructive corrosion when idle. Use "Norgrens", for MAXIMUM POWER from every air tool; MAXIMUM MAN-HOUR OUTPUT.

—CATALOG 400—

INSTALL DIRECTLY IN AIR LINE

Clean the air; regulate pressures; lubricate every working part of the air tool. Size, type, and combination for every requirement.

C. A. Norgren Co.
220 Santa Fe Drive, Denver, Colo.

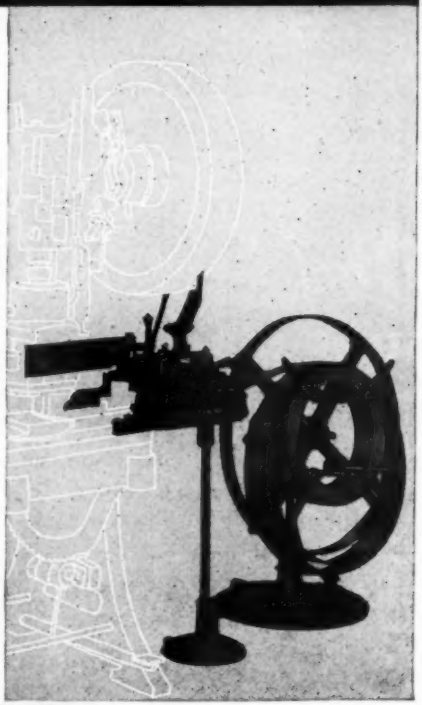
Norgren



Our Punch Presses Are More Flexible And Productive With WITTEK *Automatic* Roll Feeds And Reel Stands

Manufacturers of metal stampings facing problems in the feeding of coiled strip stock to punch presses will find that Wittek Automatic Roll Feeds and Reel Stands conserve man-hours and achieve new high production levels.

Providing an improved and simplified method of punch press operation, Wittek Automatic Roll Feeds and Reel Stands insure rapid, safe and accurate feeding under all conditions. Made in four different types to meet all automatic feeding requirements. Write for complete details. Wittek Manufacturing Co., 4305-15 West 24th Place, Chicago, Ill.



ARMY E NAVY

WITTEK WMCo *Automatic*

ROLL FEEDS and REEL STANDS

For All Makes and Sizes of Punch Presses



Presenting

MID-WEST'S "B" BOND WHEEL

for

GRINDING TUNGSTEN CARBIDE

Now, after more than a year of the most severe tests known to mechanical science, we formally present the MID-WEST "B" BOND WHEEL, designed and built especially for grinding tungsten carbide parts.

For more than a year, while our "B" BOND wheels were being used in production plants throughout the United States, we restrained our pride, refrained from mentioning them in any advertising. Our factory tests told us we had produced a GOOD wheel for tungsten carbide grinding. But we wanted to be certain our engineers had produced a BETTER, MORE EFFICIENT wheel for that type of work.

And now we know! Now we know the MID-WEST "B" BOND WHEEL, by virtue of its splendid performance in actual production usage, is worthy of the MID-WEST label. MID-WEST "B" BOND WHEELS have three outstanding features: THEY CUT FASTER. THEY CUT COOLER. THEY CUT SMOOTHER.

Order MID-WEST "B" BOND WHEELS today. Reasonably prompt delivery.

Mail Today

Gentlemen: *Please send me further details on MID-WEST "B" BOND GRINDING WHEELS.*

*Name*_____

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MID-WEST ABRASIVE COMPANY

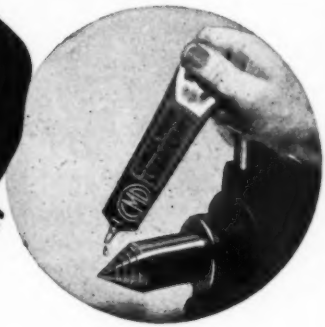
Manufacturers of DEPENDABLE Abrasives

1060 E. MILWAUKEE AVENUE DETROIT, MICHIGAN

Increase Machine Output

with CMD CENTER POINT LUBRICANT





The amazing film strength of CMD Center Point Lubricant prevents over-heating and annealing of center points, speeds-up work, and permits heavier cuts and finer tolerances. CMD Lubricant withstands pressures greater than 50,000 pounds per square inch. Try it! You'll use it regularly.

A COMBINATION You Can't Beat!

For faster, smoother tooling, equip your machines with **CMD Helical Groove Centers** and lubricate them with **CMD Center Point Lubricant.** The exclusive left-hand helical groove conveys the film of oil to the extreme point, **assuring complete** and **constant coverage** of the **entire bearing surface.**

Write for FREE *Sample Kit*

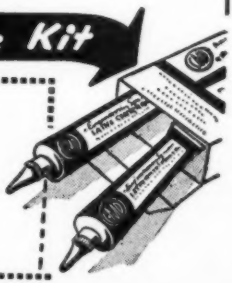
CHICAGO MANUFACTURING & DISTRIBUTING COMPANY
Dept. 6-BB, 1928 West 46th St., Chicago, Ill.

- ☐ Send circular on CMD Helical Groove Centers
- ☐ Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT LUBRICANT and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

NAME.....

FIRM NAME.....

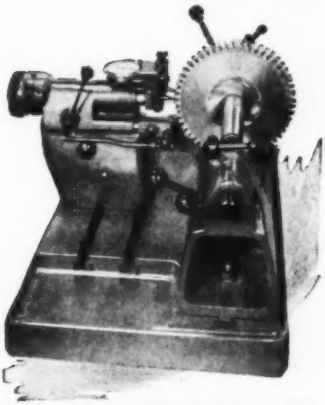
ADDRESS.....



A New Device FOR TESTING CONCENTRICITY of external spur and helical gears



Fellows No. 12-C Cone-Point Testing Fixture. Automatic Indexing enables checking to be speedily accomplished.



By the simple exchange of interchangeable measuring brackets, conversion may be made to a Circular Pitch Testing Fixture, as here illustrated.

Fellows has created two new testing fixtures, utilizing a common base, head and tail stocks —and interchangeable "measuring" brackets. One fixture is for testing *CONCENTRICITY*, and the other for *CIRCULAR PITCH*.

In each instance the inspection readings are made with 1/10,000 dial indicator—and in each case an automatic indexing device speeds up the checking operations. Capacity: —15 inches between centers, gears up to 12 inches pitch diameter.

Full particulars upon request. Write

THE **FELLOWS** GEAR SHAPER COMPANY

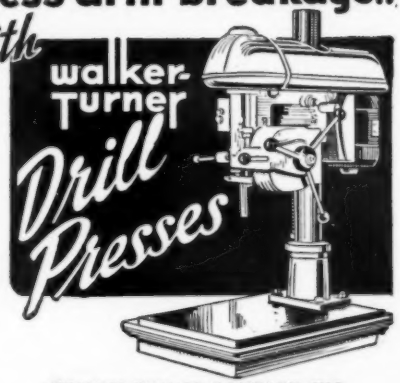
78 River St., Springfield, Vermont — 640 West Town Office Building, Chicago, Illinois — 616 Fisher Building, Detroit, Mich.

More production-less drill breakage...

USING the right size and type of drill press for the job can make a big difference in production and in preventing drill breakage. A heavy machine for a light job is as wrong as a light drill press for a heavy job.

Walker-Turner Drill Presses are made in several sizes and models for drilling holes from the smallest up to ¾" in steel. Wide speed ranges, smooth-running spindles and sensitive feeding mechanism, insure ideal drilling conditions for all materials.

The high quality of Walker-Turner Drill Presses is due to careful design and discriminating selection of material, based on the manufacture of hundreds of thousands of these machine tools. Volume production makes them quickly available to war industries.



WALKER-TURNER COMPANY, INC.
1763 BERCKMAN ST., PLAINFIELD, N. J.



walker-turner
COMPANY, INC.
PLAINFIELD, N.J.
U.S.A.

MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS



CONTOUR MILLING *with a* PUTNAM END MILL

An intricate shape . . . a deep cut . . . this is a job for a Putnam Hi-Speed End Mill. Putnam End Mills are correctly designed and made of the best high speed steel. No matter how tough the job, try a Putnam End Mill. You will learn for yourself that they do cut faster and last longer.

END MILLS AVAILABLE IN STOCK

Some sizes and types of Putnam End Mills can be supplied immediately from stock. Your Putnam representative or distributor can tell you what are now available.

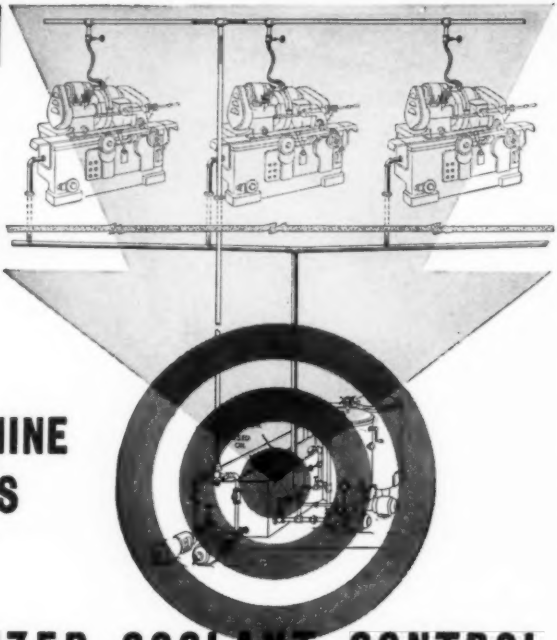
PUTNAM TOOL COMPANY

2983 Charlevoix Avenue • Detroit, Michigan

CLEAN UP—

SPEED UP—

YOUR MACHINE OPERATIONS WITH



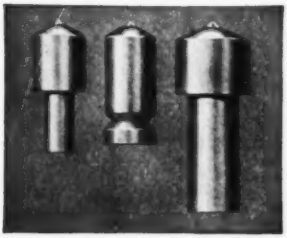
CENTRALIZED COOLANT CONTROL

Centralized coolant control promotes cleanliness and efficiency in the machine shop. Saves floor space; many more machine tools can be installed in the same area. Increases access to machines and promotes convenience of operation. Keeps floors clean; reduces danger of accidents due to oil spillage. Saves maintenance time; no large machine-cleaning crews required. Provides uniform quality of coolant. Permits easy sampling and bacteriological control. Frees your machine operators for greater production; no more "muck-raking" at the machines. Costs little more than old-style individual tanks and pumps. Write for new Bulletin A-504.

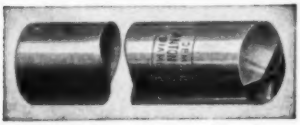
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215 Lamson St., Syracuse, N. Y.
COOLANT FILTERS • FILTRATION ENGINEERING SERVICE

KEEP 'EM FLYING

...with replacement parts that FIT!



Landis, Norton, Cincinnati Nibs



ASCO Shaped Diamond Tools for Turning, Boring, Facing

Shaped Tools • Ascopoint Dressers Valve Refacers • Impregnated Dressers • Diamond Pencils Phonopoints • Glaziers' Tools Tungsten Diamond Wheels Wire Dies • Saw Blades • Core Bits Diamond Powder.

DIAMOND TOOLS PAY FOR THEMSELVES



Machine parts *have* to be interchangeable to Speed the War Effort.

Diamond Tools are the answer to *Close Tolerances —Maximum Accuracy—Uniformity of Production.*

Demand Asco high speed cutting Diamond Tools for tolerances as fine as .0001 — avoid frequent tool changes, and that extra polishing operation (diamond tools produce a mirror-like finish).

Use Asco Diamond Tools to true and dress Precision Grinding Wheels.

• *Ask for new handbook now printing.*

ASCO DIAMOND TOOLS

ANTON SMIT & CO., Inc.

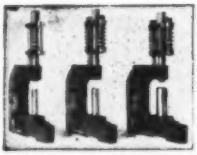
Leonard J. A. Smit, *Managing Director*

333 WEST 52nd STREET NEW YORK, N. Y.

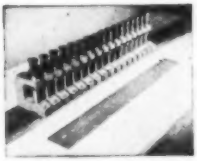
Detroit: **ANTON SMIT INDUSTRIAL DIAMOND CO., Inc., 8100 Lyndon Ave.**



PUNCHING
AND NOTCHING EQUIPMENT



"Selective Stripping" is exclusive Wales feature that provides 1, 2, or 3 springs as required.



Any size or shape holes can be punched on Wales Units.



Wales Hole Punching Units in operation at Boeing.

New die patterns . . . new die applications . . . new die setting techniques are among the many revolutionary achievements now made possible with Wales Punching and Notching Units. Nothing is attached to the press ram. Punch and die are built into each individual holder which automatically maintains perfect punching alignment.

Wales Hole Punching Units can be instantly removed or reset in series on rails or T-slotted plates. Such flexibility provides patterns unlimited . . . cuts die setting time from hours to minutes . . . makes possible sliding one set-up out of press and another pattern into position ready to operate, thus reducing "down time" of press to an absolute minimum.

All these exclusively (patented) features are daily opening up new applications . . . new economies . . . new production speed-ups.

Keep posted by writing to—

WALES-STRIPPIT CORPORATION

(Formerly The Strippit Corporation)

NORTH TONAWANDA, N. Y.

GEORGE F. WALES, President

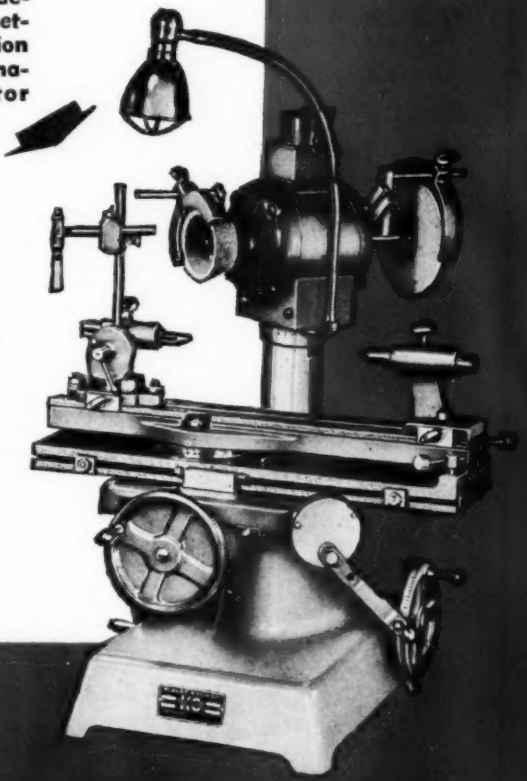
Specialists in Punching and Notching Equipment

Deliveries-30 days

KNOCK-OUT

Yes, on the Production Line or in the Tool Maintenance Room we can truly say — It's a KNOCK-OUT.

The K-O Universal Tool and Cutter Grinder is designed to permit fast setups. Rugged construction throughout insures machine longevity. Motor head mounted on complete 360° swivel.



Accurately sharpens straight, spiral, and angular milling cutters; straight, taper, spiral, and helical reamers; all kinds of light and heavy taps. Built to solve many of your internal and external grinding problems.

Write or wire for Bulletin TCG-42-6H.

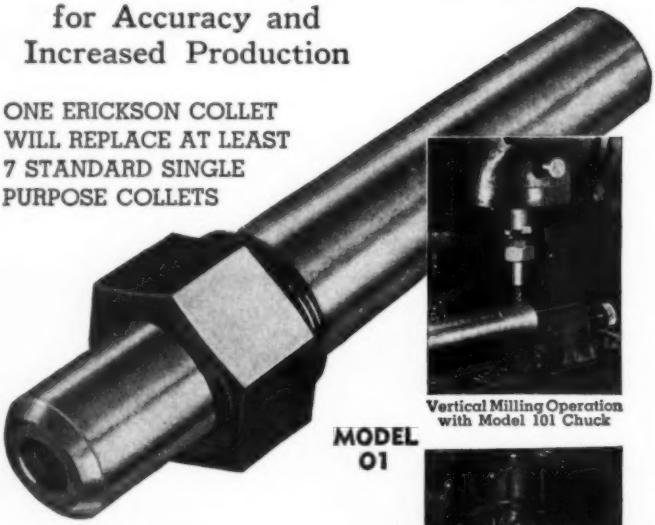
K. O. LEE CO.

ABERDEEN, SOUTH DAKOTA

ERICKSON *Precision* COLLET CHUCKS

for Accuracy and Increased Production

ONE ERICKSON COLLET
WILL REPLACE AT LEAST
7 STANDARD SINGLE
PURPOSE COLLETS



MODEL 01

Vertical Milling Operation with Model 101 Chuck



Model 201 used in Drill Press. Extra long drills can be used by extending them from the Chuck as they wear.



Tool Post Grinder equipped with Model 301 Chuck.

Send for Copy of Bulletin "D"

ERICKSON STEEL CO.

2309 HAMILTON AVENUE **CLEVELAND, OHIO**

Have you a Tough metal cleaning problem?



These engineers can help you quickly — at no cost or obligation

If you want to cut your degreasing costs and speed up your metal-cleaning work—if you have a difficult metal-cleaning job that's giving you trouble—get in touch with us *at once!* There is a lot more to solving a degreasing problem than just buying some new degreasing equipment. Our engineers travel from coast to coast working on every possible type of metal-cleaning operation. They have licked some problems that were called impossible. They are *specialists in degreasing* with many years of experience in that field. They will tackle any job—without a penny of cost or obligation to you — *and we mean just that!* Write *today* telling us what your problem is — and you will get quick action!

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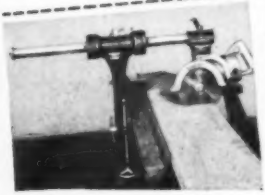
SKILSAW is light, compact, powerful . . . easy to use on every sawing job. With SKILSAW in your receiving rooms, you'll speed uncrating, too, and salvage crating lumber for your own use. Ask your distributor to demonstrate SKILSAW in your own plant *today!*

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Skilsaw Radial Arm Speeds "Gang-Cutting"

● You can saw crating lumber even quicker by "gang-cutting" with SKILSAW in the Sliding Radial Arm. Swiftly sizes wood to uniform widths and lengths for pre-fabricating boxes, crates, cradles and skids.



Featured In This Issue

MAKING BOMBERS at Willow Run is the subject of Lloyd Stouffer's story, beginning on page 111. Mr. Ford's Bomber production plans are unique in many ways and an unusual amount of interest has been aroused in the operation of this huge new plant. Numerous pictures show how Ford is doing the job.

EATING is a mighty important consideration, these days. For that reason, most of us are interested in the Farm Labor problem. Edmund Mottershead discusses the matter and its relationship to the war production job in Section X of the Foremanship Forum, beginning on page 133

SMALL MACHINE TOOLS and their Production is discussed by Dr. Frommelt in Part II of his contribution, beginning on page 157. The particular part under consideration is the lathe carriage and illustrations show how the various machine operations are handled.

SPEEDIER GRINDING of Carbide Tools is described in the story commencing on page 169. Recent developments have simplified this operation to the extent that it can now be handled by unskilled help, and in much less time.

UNUSUAL JOBS on the Production Front are illustrated and described in the story beginning on page 177. Several of these represent interesting conversions from automotive to war production.

A SPEEDY new method of brazing Carbide Tool Tips has been developed by Carboloy. It uses some interesting new electronic equipment and may be handled by less expert help. The process is described on page....185

CARBIDE DIES and the problem of servicing them for steel shell case production is covered by Earl Glen in the story commencing on page 199. He describes the common troubles and tells how to overcome them.

SPEEDIER DIE PRODUCTION describes some new practices for hastening work of this kind. The story begins on page 211 and sketches illustrate the different points clearly.

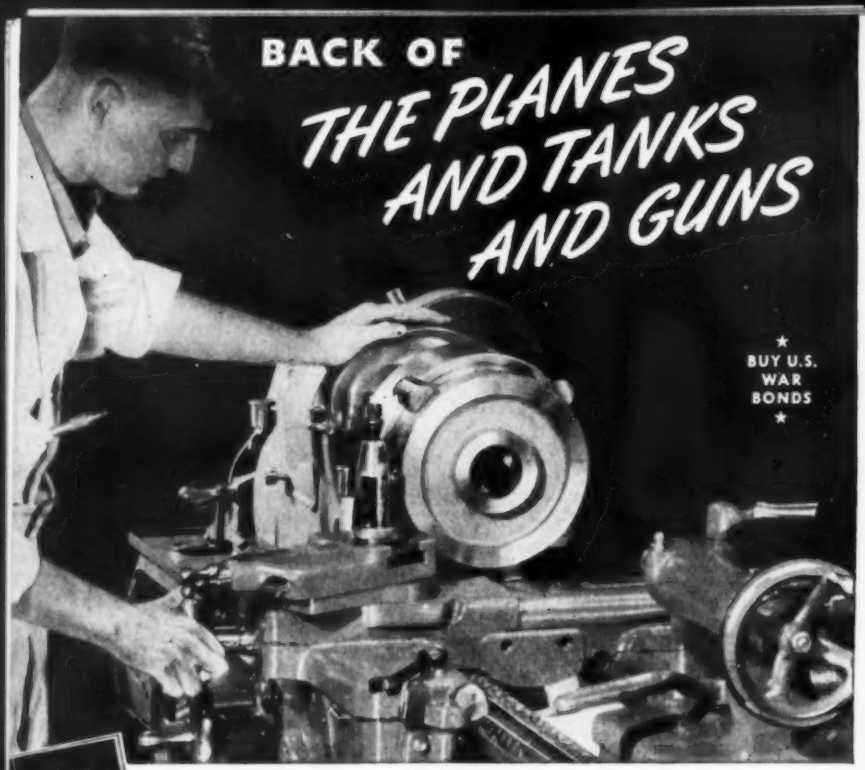
TAX HEADACHES and their remedies are discussed by Arthur Roberts in the story beginning on page 217. Perusal of it will suggest ways of avoiding worry —and perhaps saving money.

"LET'S TALK SHOP" is the regular Shop section, offering tips, hints and ideas on the handling of unusual jobs. See page 227

NEW TOOLS and innovations are presented in the section beginning on page 264. You'll find many interesting new items on shop methods and practices.

MECHANICS THRU THE AGES is the regular picture page—and it appears on page 376

The Wounded Can't Wait!
Give NOW to the
American RED CROSS





Write for your copy of Catalog 100C which describes all the South Bend Lathes.

Back of the planes and tanks and guns that are flowing in ever-increasing quantities to our fighting forces is a skillfully coordinated plan of men and machines—a combination of skill, ingenuity and mechanical perfection that is going to win.

Accuracy is the key to success of this great plan. Without the split-thousandth tolerances that assure perfect interchangeability of parts, the production goals could not be attained—and not enough planes and tanks and guns would reach the war fronts.

Capable of fulfilling the demands of urgent war production, South Bend Lathes have the accuracy and speed for the most exacting precision operations, plus ruggedness and power for efficient service. They are made with 9″, 10″, 13″, 14½″, and 16″ swings in both Quick Change Gear and Toolroom models.



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As The Editor Sees It



RECENT statements in the press announced that WPB plans a drastic cutback in machine tool output and war plant construction, because "we are now fully tooled to beat the axis."

Naturally there were repercussions from the machine tool field. General Manager Tell Berna of the National Machine Tool Builders Association pointed out to interviewers that the statement gave a decidedly erroneous impression. The tool industry's job in the war effort is still far from completed.

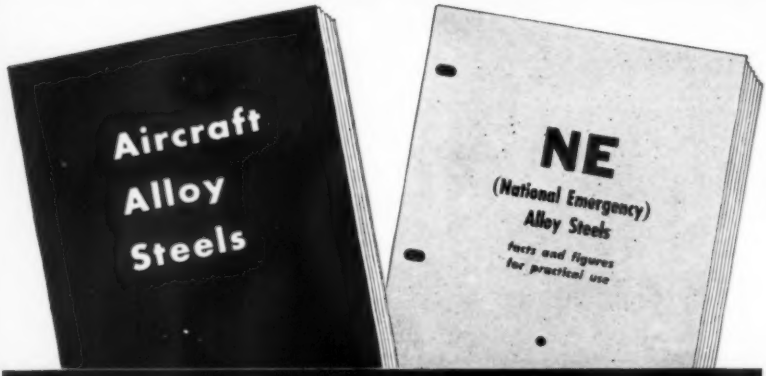
Evidently, what the WPB meant to convey was that in the future, the "screening out" process of orders for machine tools will be tightened down. We are now in a better position to know just what is needed and WPB is able to consider each request for tools more carefully.

Mr. Berna stated that the industry has a backlog of 500 million dollars in orders, partly Russian — enough to maintain full production well into next Winter.

Undoubtedly, many new and additional machines will be needed to build innovations in war implements, such as are being constantly developed — or to relieve bottlenecks in serving the needs of our armed forces.

Aside from the building of tools, Mr. Berna explained, many plants have already converted parts of their facilities to the production of war supplies, and others have plans for conversion when it becomes necessary.

Wesley G. Paulson



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Aircraft Alloy Steel bars of 4140, X4130 and NE 8630 are carried in stock at Ryerson plants in Chicago, St. Louis, Cincinnati and Jersey City. Send for your copy of our combined Aircraft Stock List and AMS condensed specifications.

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RYERSON STEEL-SERVICE

Making Bombers at Willow Run

By LLOYD STOUFFER

FORD'S gigantic Willow Run bomber plant is unique in many ways.

It is said to be the world's biggest airplane factory—the most comprehensive individual manufacturing operation of this or any other war.

It was thrown up from the bare prairie in less than a year's time, designed and equipped down to the last rivet gun for the most efficient manufacture of the single war product it is now turning out—huge, four-motored B-24 Consolidated "Liberator" bombers.

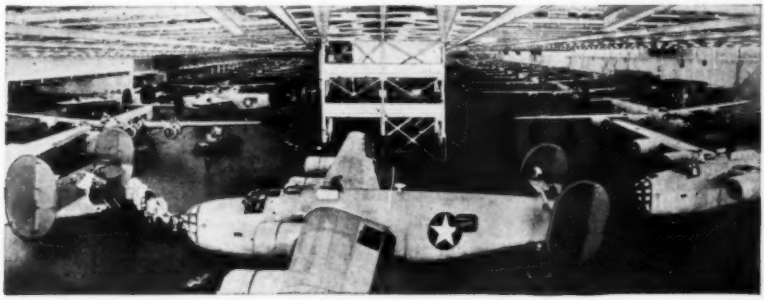
It is the most elaborately tooled and fixtured plant for one specialized production job the world has ever seen.

It is a supreme test of the automotive assembly-line production technique as applied to one of the largest and most complex items in the entire United Nations' category of heavy armament.

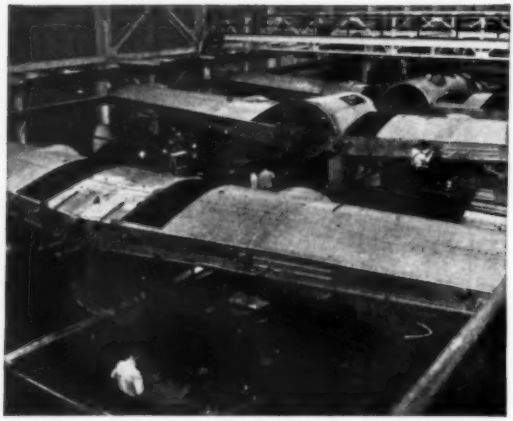
And this jewel among manufacturing plants is, perhaps to a greater extent than any other major war plant in this country, in the tender hands of housewives and schoolgirls who, until a few months ago, had never seen the inside of a factory.

Willow Run is now coming into its own after a period of trials and tribulations so bewildering that two Congressional committees felt called upon to "investigate." It still hasn't licked all its employment and housing problems—but completed bombers are rolling off the assembly lines at a pace calculated to confound the critics who charged that it was "over-tooled"—too inflexible to meet the demands of aircraft production.

Whether or not the plant is over-tooled will be answered within the next few months, during which schedules call for a steadily accelerated flow of completed bombers. So far, in spite of all difficulties, production is on sched-



This photographic panorama, made from a series of pictures taken from ceiling height at Willow Run, shows B-24's coming down the two assembly lines. Planes in the foreground have been turned and are headed toward the camouflage and pre-flight departments.



A striking view of the mating position, with center wing section in foreground. In center, mating fixture has been attached, and at rear, a nose is shown mated to center wing-mating fixture.

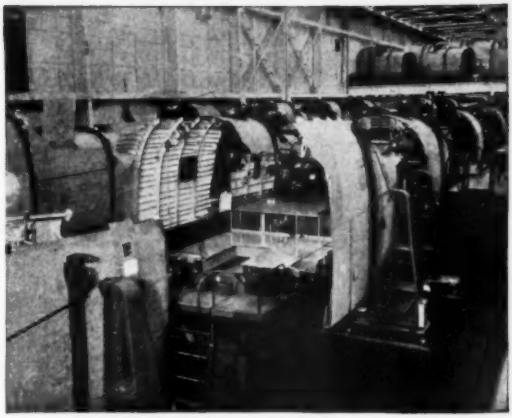
ule—and it appears likely that critics of the elaborate tooling setup will have to eat their words.

For one thing—whether it was designed with that aim in mind or was merely the product of the ingrained automotive technique—the labor-saving and error-eliminating setup of tools, jigs and fixtures is helping to solve one of the plant's biggest coincidental problems:—the necessity for using women in what have always been considered men's jobs. Because specialized jigs and fixtures and special-purpose machine tools make virtually automatic, thousands of operations which previously required experienced operators, it is possible to use quickly-trained women in a very high percentage of the jobs.

Recent Willow Run employment figures approved by the censors show that more than 30,000 persons are now working in the plant, and of these, some 10,000 are women. At peak production, the



The tail side panels of both forward and aft sections of the bomber fuselage are assembled in fixtures much resembling those used in attaching the skin surfaces to the stringers in the wing sections. Curved uprights simulate the contour of the body, with notches for locating the stringer positions. Side elevators, electrically controlled, enable the workers to move up and down.



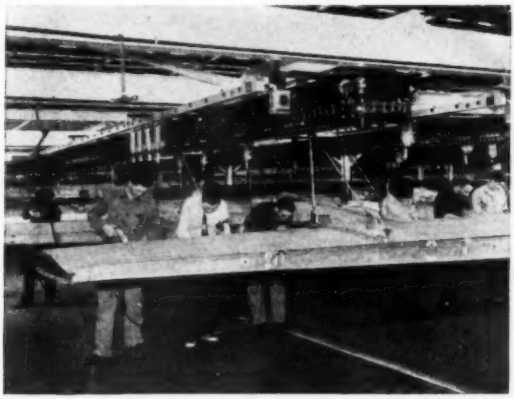
Assembly of the fuselage-nose side panels to the pilot's and radio operator's floor is facilitated by vertical frames sliding on tracks to establish the correct distance from the plane centerline.

plant is expected to employ around 90,000—and if this same percentage holds good at least 30,000 will be women.

Production figures remain a closely-held secret, but it can be stated that many scores of completed bombers have now been flown away from the huge airport adjoining the plant, and more are being delivered to the Army Air Forces each week—at a constantly accelerated pace. And at the same time, huge quantities of parts and sub-assemblies are being shipped to other Consolidated assembly plants.

Early last December, it was disclosed officially that monthly output would reach three-figure monthly totals by March, and that full peak production would be reached by late summer or early fall. Production to date is "on schedule." And it is understood that last year's schedule has been revised upward.

Achievement of continuous-flow as-

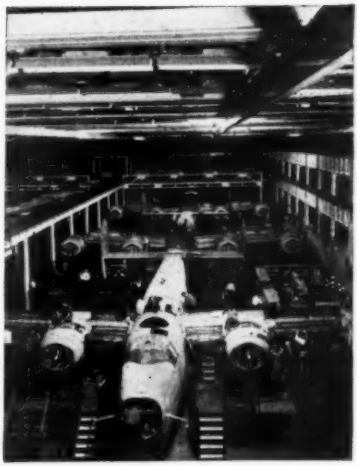


This picture gives an idea of the tremendous network of overhead conveyor lines which convey parts in sub-assembly bays of the Willow Run plant. Workers are riveting the duralumin skin to a wing section.

sembly has been a job as gigantic and complex as the bomber itself. As in all aircraft production, there have been countless design and engineering changes in the bomber, some dictated by behavior of the aircraft in combat, others found desirable in the interests of facilitating fabrication and assembly. Ford is betting that the heavy investment in time and tooling will pay off with a high rate of output in the stretch, where the race is really run.

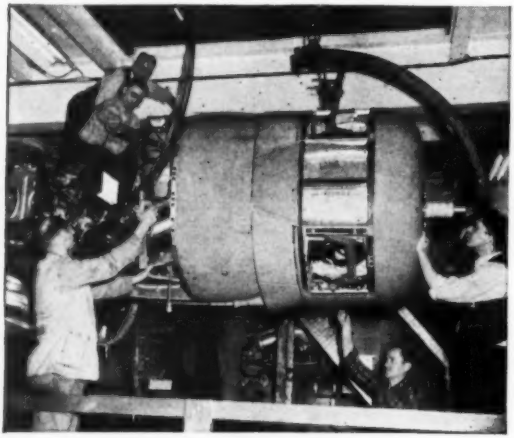
The tortuous process of tuning up and getting production flowing was anticipated, both by Ford and the Army. That's why it is possible to say that output is on schedule. But the long months spanning the time when the plant started operations and the day when it was possible to say that bombers were actually coming off the assembly lines created a certain amount of public unrest and started wild rumors about a bogdown at the plant.

Seeing is believing. And clearly visible at Willow Run today are primary and final assembly lines stretching as far as the eye can see, jam-packed with bombers in progressive stages of completion. Today, both final assembly lines are moving, steadily, 24 hours a day, seven days a week.



A close-up of a final assembly line at Willow Run, with scores of workmen swarming over and inside of each B-24 bomber.

Along with the triumph of making this behemoth move and breathe, Ford has the satisfaction of having material-



A delicate assembly job is the fitting into place of the four Pratt & Whitney engines which are assembled into each B-24 bomber.



WHEN "Correct" DESIGN IS "Wrong" DESIGN

Each gear or spline finishing process superimposes individual modifications on the fundamental "correct" design of a hob or shaper cutter.

If you are going to finish-hob or finish-shape you may need one kind of a semi-finishing tool.

If you are going to finish by grinding, you may need a different kind of a semi-finishing cutter or hob.

If you are going all-out for accuracy by using "gear-shaving", you may need a still different kind of cutter or hob—a "PRE-SHAVE" tool.

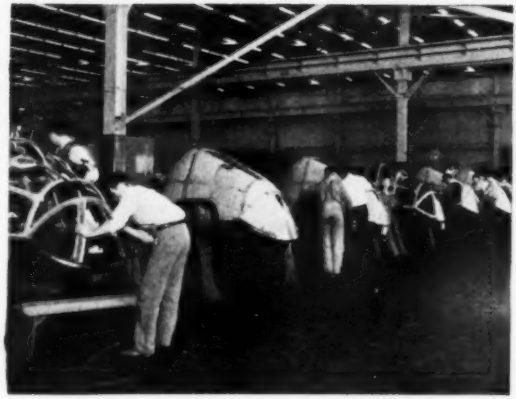
The differences are small. Usually they are measured in thousandths. But those thousandths spell the difference between a correctly "DESIGNED" and a correctly "PERFORMING" gear or spline cutting tool.

That's why Michigan hobs and shaper cutters do such an outstanding job. They are engineered to the finishing process employed as well as being fundamentally correct. Our engineering department will be glad to tell you whether or not you are really using the right gear cutting tool or what changes you should make to improve gear quality.

BUY U.S. BONDS STAMPS

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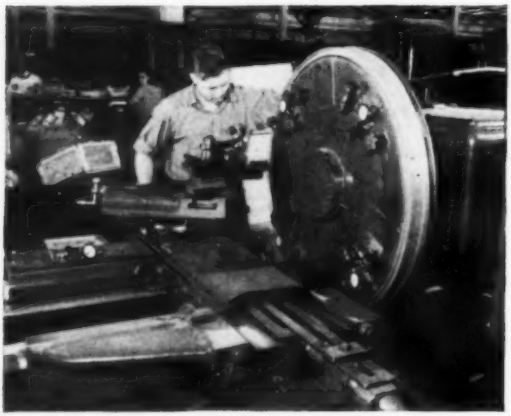


Several Ford improvements were made on production methods in the subassembly of the pilot's and bombardier's enclosures at Willow Run. The fixtures themselves were designed by Ford engineers. Underframes are made on draw dies in large sections, providing additional strength and fewer operations.

ly reduced man-hours of production and cost of the big bomber. Time and labor-saving devices pioneered by Ford engineers have been extended, insofar as possible on differing equipment, to other airplane plants, with the net effect of speeding up production and cutting the cost to taxpayers of the entire vital airplane program.

Built up from more than 1,250,000 parts, bound together with more than 700,000 rivets, the Liberator once required nearly 200,000 man-hours of labor to produce. This time has been materially reduced, and Ford techniques —many of them adapted straight from automobile-manufacturing experience— are expected further to reduce the labor investment in each plane as the program moves along.

It was originally estimated that the Willow Run plant at peak would require 120,000 workers. Although the manufacturing schedule has been stepped up in the meantime, this estimate now stands at 89,000, and is subject to further reduction.



On this Le Blond machine lathe, a special fixture was provided for the part that is being machined, the bottom track of the gun mount in the rear turret of the B-24.



AMERICAN AAF AIR FILTERS

WAR ON DUST AT THE FRONT—AS WELL AS AT HOME

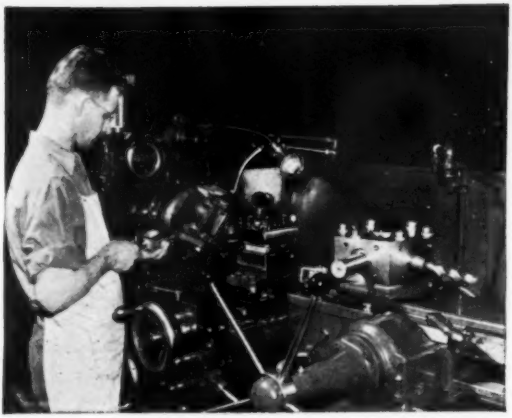
On every front line airport, as in every war industry at home, the daily battle against dust never stops. In Tunisia, on Guadalcanal—wherever our war planes operate, AAF airplane engine filters keep them flying 10 times as long.

On the home front dust engineering has assumed its rightful place as an essential part of production planning in practically every war industry. If you have a troublesome or dangerous dust condition in your plant write us. Send for "AAF In Industry"—a free booklet describing the complete line of AAF equipment.

AMERICAN AAF AIR FILTERS

AMERICAN AIR FILTER COMPANY, INC., 312 CENTRAL AVE, LOUISVILLE, KY.

IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.



Production machining of small parts (gear case) at Willow Run is speeded up by mounting piece in fixture on face plate of turret lathe. Limits are .0005

Military authorities now permit a fairly complete word picture of the manufacturing operation, and the photographs which they have approved are, perhaps, even more revealing.

The immense bomber plant building —which, until the recent construction of the Dodge-Chicago airplane engine plant, was the world's largest factory under one roof—is divided into two main sections:—manufacturing and assembly.



Milling of wing splice plate is simplified by use of holding fixture and specially mounted cutting head. Splice plate is mounted in position on holding fixture. Cutting head is counter-balanced by a weight so that a roller between cutters follows contour of the plate. Machining time:—2 to 3 minutes.

Popular interest of course centers on the spectacular assembly lines, but it is the manufacturing section which is the backbone of the factory and the automotive key to mass production.

Materials such as sheet aluminum, Alclad, castings and forgings are routed from the receiving department through laboratory and inspection departments. Castings and forgings are x-rayed carefully to disclose the slightest defects—the first of hundreds of checks and inspections.

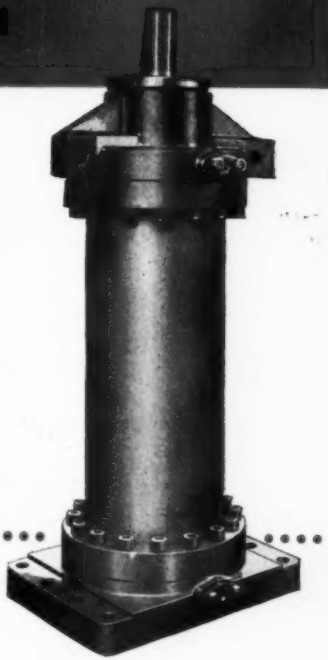
From inspection, materials go to the planning and shearing department, where items are laid out so that each piece of material is used with maximum economy. After shearing, the sheets are sent to the press shop, where they are shaped and formed in presses ranging upward to the mammoth Lake Erie and H. P. M. units, weighing 350 tons each and exerting a pressure of 1,000 tons.

Blanking and piercing operations, forming operations and draw die work—the latter a complete innovation in the aircraft industry—are in many respects

BIG

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—precision built by HANNIFIN



Big or little, Hannifin cylinders all present the same advantages of no-tie-rod design and precision construction with mirror-finish honed cylinder bores. Honing produces a straight, round, perfectly finished cylinder interior, for high efficiency piston seal with minimum fluid slip and maximum power.

Whether you need unusually large cylinders or small sizes, Hannifin precision construction can help you make the most of hydraulic power advantages. Hannifin standard cylinders up to 6-inch bore are built in seven standard mounting types, with or without cushion. Many other cylinders are available, all sizes, any length of stroke. Write for Bulletin 35-H.

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11-in. bore x 6-ft. Hannifin hydraulic cylinder designed for tilting a large electric furnace. Maximum working pressure 2000 lbs. sq. in.

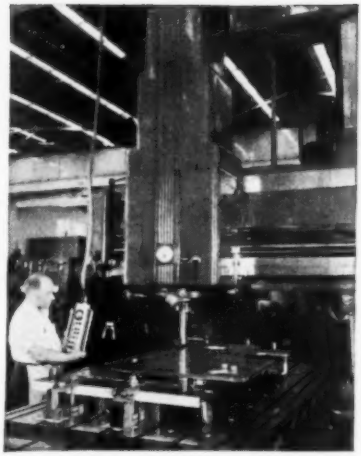
HANNIFIN *Hydraulic* CYLINDERS

blazing new trails in aircraft manufacture.

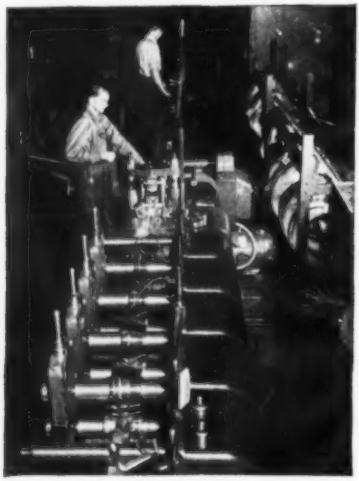
There are four of the 1,000-ton hydraulic presses, especially built to Ford specifications. They are said to be the first streamlined presses of their type with hydraulic equipment placed beneath the floor, out of the way, rather than above the machine. This arrangement makes for greater speed and ease in moving dies in and out of the presses by cranes. And the location of the hydraulic equipment in the pit permits servicing without interfering with operation of the press or tying up the overhead cranes.

The biggest presses are mounted on 16-foot cast steel sub-bases, set in the concrete pits to bring the press beds to easy working height above the floor.

By the use of mechanical presses and all-metal dies, to an unprecedented extent in this type of work, production time has been greatly reduced. Blanking dies are used instead of a profiler for duraluminum parts. And Ford's success with unusually deep draws on the presses is responsible for the elimination of many hand-forming operations.



A complete tool and die department, capable of correcting and maintaining dies and fixtures, as well as templates and machines, was the first department established at Willow Run. Included in its machine equipment is this open-side Ingersoll mill, the vertical head of which can be moved up and down and to the left or right of the table.



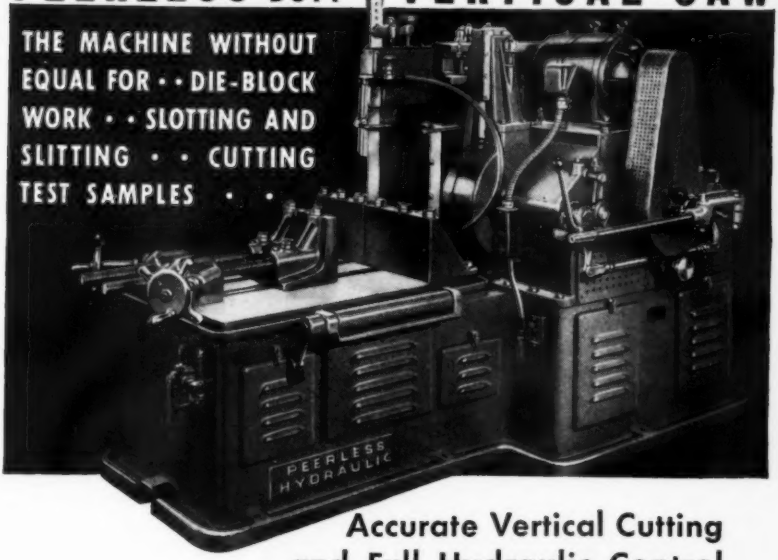
Stringers are produced from coiled aluminum strip by roll-forming on Yoder mills. By changing rolls on these machines, up to 700 different channels, angles and more complicated cross-sections are produced at a high rate of output.

Many of the stampings for bomber doors and hatches are large and complex. Some of these units, when made by other manufacturers with drop hammer and hand-forming processes have passed inspection about 20 to 30 per cent. But on some units, Ford is said to be approaching 100 per cent inspection o. k. by the use of steel dies in heavy presses.

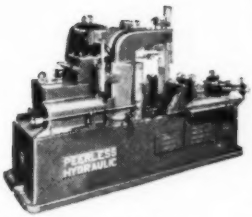
An example of deep drawing is the main entrance hatch outer shell, which is formed in an H.P.M. press out of one piece of heavy-gauge sheet metal in one operation instead of the customary two. The draw is about 3½" deep. Previously, the part was cut out in the center and the outer skin then riveted to the shell.

PEERLESS HEAVY DUTY VERTICAL SAW

THE MACHINE WITHOUT EQUAL FOR · · DIE-BLOCK WORK · · SLOTTING AND SLITTING · · CUTTING TEST SAMPLES · · ·



Accurate Vertical Cutting and Full Hydraulic Control



The Massive High-Duty Peerless Vertical Cuts 10 x 24-in. Tool Stock Without Turning the Work.

For sawing valuable tool stock, this Peerless VERTICAL is highly profitable to tool and die manufacturers. The large, squarely cut scrap pieces are usable for smaller dies, strippers and stripper plates. Steel mills use Peerless Verticals for cutting test samples from billets. Extension of the working table to 35 in. permits loading by crane. Tool steel 24 in. long and up to 10 in. wide can be sawed through without turning the work.

Peerless — the only vertical cutting saw of this type—also is the only saw with full hydraulic control of the feed, blade lift, blade return and elevating stock rollers. It will pay you to check into Peerless advantages.

Mail the coupon for estimate of cutting time on your toughest operation.

PEERLESS MACHINE COMPANY
1600 JUNCTION AVE. • RACINE, WIS.

Peerless Machine Co., Dept. MT-643, Racine, Wis.

Mail cutting time estimate for.....

.....

☐ Mail catalog on Hydraulic type Saw for High Production Cutting
☐ Mail catalog covering Vertical type used for Die Block Work
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Peerless

THE ONLY METAL CUTTING SAW WITH FOUR-SIDED SAW-FRAME AND BACKING-PLATE

Fast ACCURATE *Sawing* DEMANDS PEERLESS BLADE CONTROL

Tremendous punching dies are used for prepunching rivet holes in ribs and stringers. In one of these setups, 200 rivet holes are punched simultaneously by means of standard Strippit punches in a Cincinnati press brake.

In other sections are special facilities for rolling and forming stringers and for shaping all kinds of braces and supports. This forms a large part of the manufacturing program.

new, like every other piece of equipment in the plant, the machines in gleaming rows are a veritable exposition of the latest and best in the machine-tool world. There are dozens of special-purpose machines, in addition to the standard setups.

The machining job is comparatively small because a large percentage of the bomber parts requiring machining, such as the Pratt & Whitney motors, arrive



Women are adept at handling drilling machines. With the Footburt drilling units shown here, parts are held in special fixtures which locate holes and reduce the likelihood of error.

Stringers are produced from coiled aluminum strip, by roll-forming on Yoder mills. By changing rolls on these machines, up to 700 different channels, angles and more complicated cross-sections are produced at a high rate of speed. Distortion of stringers in the heat treatment is corrected by gripping them in an Ajax hydraulic stretching machine, which stretches them as much as 3½ per cent, removes curvature and slightly wold-works the metal.

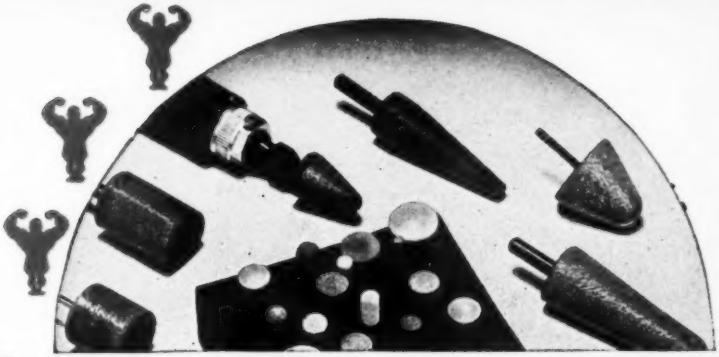
Forgings and castings, after being x-rayed, are routed through the machine department, where they are machined, gauged, inspected and treated for corrosion prevention.

In comparison with the size of the plant, the machine shop is not so large as might be expected—but it is still one of the largest and certainly one of the best-equipped in the country. Brand-

in finished condition ready to be installed in the plane. Nevertheless, a tremendous volume of miscellaneous structural and mechanical parts is involved.

As will be seen from the accompanying pictures, a large percentage of the standard machine tools, even including heavy turret lathes and milling machines, are operated by women, specially trained in the $500,000 school which forms an annex of the bomber plant.

There are special lathe and milling setups for the machining of gun mount parts and the numerous splice plates for wing sections. Automatic screw machines turn out many thousands of bushings and washers. Such plane parts as gear cases form a large machining requirement.



Mighty Midgets

ABRASIVE COMPANY

MOUNTED WHEELS AND MOUNTED POINTS

They're little, yes—but mighty important to the metal-working industries engaged in making Uncle Sam's war equipment.

ABRASIVE Mounted Wheels and Points perform many thousands of intricate and difficult precision grinding jobs in war plant tool rooms and on production lines . . . for die grinding on alloy and hardened steels, for burring and "breaking edges" on precision ground mechanical parts, for cleaning out stock and for grinding out those "hard-to-get-at" places so frequently encountered.

Airplane engines, gun mechanisms, tank parts, shells and bomb parts are regularly being ground at various stages throughout their manufacture with ABRASIVE Mounted Wheels and Points. Expert skill and experience in making abrasive materials and bonded abrasive products for over fifty years permit us to offer war manufacturing industries a complete line of all sizes, shapes and specifications of mounted wheels and mounted points of the highest quality.

Special types of abrasives, and manufacturing facilities give ABRASIVE Mounted Wheels and Points a fast, cool cutting-action, long useful life and a high degree of mechanical accuracy. Try them on your work, now—both in the tool room and for production. Your inquiry will bring complete details.

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

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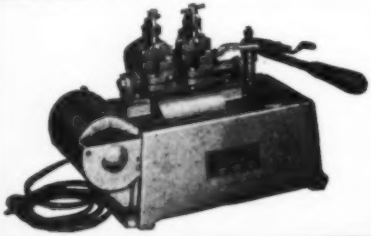
Heavy machinery responds to woman's touch at the Ford Willow Run plant. This young woman is operating a turret lathe after a short period of training. Approximately 30 per cent of workers at Willow Run now are women, and this percentage is due to increase.

The Willow Run plant is especially notable for its complete and well-organized tool and die department. The very first department set up in the plant, while major sections were still under construction, the tool and die shop is capable of correcting and maintaining all dies and fixtures in the plant, as well as templates and machines.

In addition to its straight production processes, the plant carries on considerable research and experimentation in improved machining and welding techniques, and as fast as new processes are proven, they are incorporated in production lines. One of these innovations is the employment of refrigerated points on spot-welding machines, enabling a 100 per cent increase in production, even with comparatively unskilled girl operators.

Welding processes to eliminate the slower riveting technique are being extended and adopted wherever possible. The experimental section has a large Sciaky machine, on which it is currently testing the practicability of spot welding the zero bulkhead of the center wing section. This part is so large it must be handled in the machine by two men.

Minor departments, which feed parts to sub-assemblies and eventually to the final assembly line, include tube bending, where more than 900 different shapes and sizes of tubing are formed; plexiglass, where plastic is formed and shaped to make the pilot and bombar-



BAND SAW WELDERS

The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to ¾" wide may be welded.

1 KVA—110 Volt—60 Cycle—single phase—5 point heat control—1 point anneal heat—Weight 40 lbs. Let us send you further details.

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"Don't waste important materials" is the nation's war-effort warning. The most effective way to conserve tool steel is to make it do more work—through top-quality tools.

A Nicholson or Black Diamond file contains no more steel than an inferior file of the same size and shape. But, compare the number of efficient file strokes the user can get from each, and the quality product will outlast and outperform the other every time—usually by a wide margin.

Thus, file quality is also a big *labor-cost* factor. The difference in cost between good and inferior files isn't a "drop in the bucket" compared to the difference in labor values they represent.

So correct in design, accurate in cut, uniform in hardness are Nicholson and Black Diamond files that for years Nicholson has been able to *guarantee TWELVE PERFECT FILES IN EVERY DOZEN.*

FREE BOOK, "FILE FILOSOPHY" — 48 pages on files and filing . . . with high-lights on proper use and care. For production and purchasing heads, shop superintendents, foremen, key mechanics.

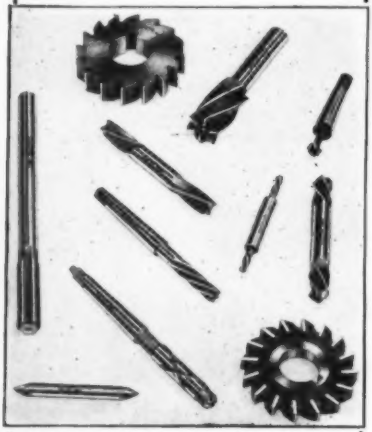
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Prompt Delivery on Special Tools, Dies, Jigs and Fixtures Made to Your Exacting Requirements.

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Write for prices on standard sizes or submit blueprints for special sizes.

Galter Manufacturing Co.
711 W. Lake Street - Chicago, Ill.

dier enclosures; small-parts assembly, such as controls, doors, door air ducts, motor nacelles, cowling and camera mounts, etc. All parts are handled by conveyor, and are delivered first to a paint shop and then to the assembly lines.

The conveyor flow from the manufacturing section to the assembly lines, is in the best tradition of automotive timing, which to the outsider seems little short of miraculous. The task of getting the exact part needed to the exact spot at the exact time is many times more complex in the case of a big bomber, which contains many times over the number of parts in an automobile, but it is accomplished quite smoothly.

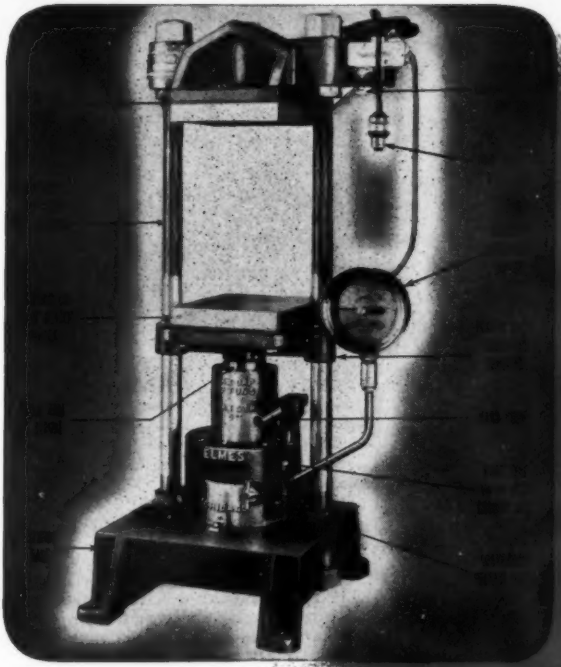
There is a constant flow thru unit assemblies of disformed parts such as bulkheads, hat stringers, belt frames, floors, bomb and hatch doors, skin and stringer assemblies, fuselage panels, center wing flaps, ailerons, leading and trailing edges and tail surfaces.

These major units flow in from various departments along conveyors or by crane, growing steadily into larger units until at length they arrive at transfer bays, where they meet the center wing section. Similar sub-assemblies are mated as they travel down the final assembly line.

The final assembly line is actually a series of stations, each a platform built up to the proper height for easy access to the wings, fuselage or whatever part is to be worked on. Workmen seldom leave their stations, each having at hand all the tools, parts and equipment needed for the operation at that point.

At each of these stations, certain installations take place. Forward and aft fuselage sections are mated to the center wings; the four engines descend from an overhead balcony to their proper places; the tail surfaces follow, and when the ships complete the journey they have grown from their embryonic, disjointed stage to giant bombers, ready to take to the air.

Various types of conveyors, from those moving the huge center wing sections to toe conveyors which draw the



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Take a minute to study this picture. Here's a hydraulic press by Elmes that is meeting today's urgent needs in numerous commercial and scientific laboratories. It is being used for Blocking, Breaking Tests, Briquetting, Cake Forming, Forcing, Forming, Gluing, Laminating, Compression Tests, Dehydrating, Drawing, Embossing, Spring Testing, and a host of other jobs.

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BOYAR-SCHULTZ CORPORATION

2108-G Walnut Street CHICAGO, ILL.

ship forward by its nose wheel, are used on the final assembly lines.

As the planes move from the end of the assembly line to the flight test department, they pass through spray booths which are among the largest in the world. Fireproof doors, each weighing 45 tons, close the entrances and the exits of the two booths. Here the B-24 receives its final coat of paint—olive-drab on top and camouflage blue-gray beneath.

Flight-testing the big bombers requires an immense airport, which is the last word in construction and facilities. Covering more than 1,200 acres, the airport was designed as an all-over field. Six runways, each 160 feet wide, dominate the field. They range in length from 4,970 feet to 6,250 feet. In all, the runways are equivalent to a two-lane concrete highway 22 miles in length.

Fifty miles of electrical conduit were laid to provide the lighting system. All or any part of the field can be floodlighted, and special lighting equipment enables pilots to land during a blackout.

Upon acceptance by Army inspectors, the planes become the property of the Army Air Forces and are flown away to ferry points, battle stations or modification centers where they may receive special equipment.

The eight-section hangar at Willow Run can house 20 of the bombers at one time. Eight tremendous hangar doors, each weighing 45 tons, slide up and down at the touch of an electric button. Ample facilities for visiting flight crew members are provided on a tract adjacent to the airport.

TURRET TOOL POST

Hardened throughout, self-compensating for wear, precision built. For top production on small South Bend, Sheldon, Clausing, Atlas, Logan and similar bench lathes and small screw machines.



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Manufacturers and Selling Agents

THE SAME METHODS WILL WIN YOUR POST-WAR BATTLES

Since welding is taking such a big hand in winning the war, why shouldn't I watch it closely for ideas to win my battles for business after the war?

ALTER EGO: That's logical. Where you see welding, you see faster production and far better ships, planes, tanks and guns. The same basic methods can be used after the war to cut costs and build better autos, machines, appliances and buildings.

Can I get any ideas from the wartime gasoline tanks they're welding here?

ALTER EGO: Sure! In the first place, they're welded. And they're welded fast. Ever hear of welding 10 to 14-gauge sheet with 3/16" electrode? Usual practice requires 1/4" or 5/32" size. This shop developed fit-up jigs and positioning fixtures to allow the 3/16" size. *This bigger electrode saves them 33% in man-hours.*

Then, the big problem is not only to find ways to apply welding to my post-war products, but to find ways to beat competition on the cost of my welding.

ALTER EGO: You're right. You should use this double approach to post-war profits by keeping an eye on the big war-job welding is doing . . . and by all means, ask for Lincoln cooperation on design and production.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

then I said to myself—

THERE'S ALWAYS SOMETHING NEW UNDER THE ARC



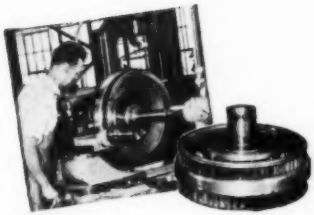
Every one of the four jobs described below took advantage of the versatility of Monarch lathes to increase production or to save waiting for new machines. If you think you can use your lathes to better advantage, perhaps we can help you. Monarch men, here at Sidney or in the field, are always at your service.

Four ideas for the V-SHIFT

THE MONARCH MACHINE TOOL COMPANY
SIDNEY • • • OHIO



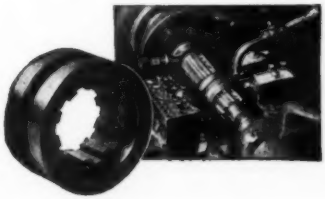
1 This job is being done on a Monarch lathe, instead of waiting for another machine tool. It consists of rough-turning, facing and back-facing cylinder head flanges. Work is gripped in an air chuck on a rough surface. Alignment is checked with special fixture in tailstock. Capstan handwheel permits quick movement of fixture to and from work. Tool blocks, on front and rear of cross slide, hold forming and turning tools. Front tools do part of operation, then feed is reversed in apron; slide traversed for rear tool operation, with power feed and working to automatic diameter stop Only one setup required.



2 Months of time were saved on this job by utilizing a smaller Monarch than apparently was required. A 36" lathe was indicated, for finishing contour surfaces of aluminum housings. By raising to provide a 36½" swing, a 22" Monarch does the work, with smaller size Monarch-Keller controls. Careful job analysis saved time, saved $58,000 in first cost, and production is kept on schedule.

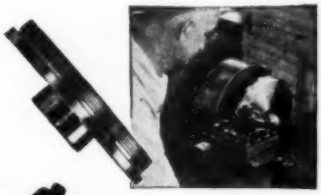
3 Finishing of this heavy, double-jawed clutch consists of turning OD, forming groove, straddle facing sides, necking groove diameter and chamfering 4 outside corners. It's all done in one setup on a Monarch 18" Model BB lathe, with double connected rest, tool block in front, and multiple tool block in rear. Here are the steps:

1. Press piece on spline arbor and place between centers in lathe.



2. Turn OD, using tool in rear tool rest.
3. Form groove, allowing for grind. Tool in rear rest.
4. Straddle face sides, and chamfer. Tools in front tool rest.
5. Neck diameter and sides of groove for grind relief.
6. Remove from machine and press off arbor.

Time—8 minutes per piece.



4 Another example of using machines at hand, instead of waiting for new ones. Job is to turn base plugs for bombs. The hub is turned on an older Monarch. Then, they chuck on this hub with a 3-jaw chuck, using square turret with multiple positive carriage stops and clips on cross-feed dial. Now they're ready for these operations, in one setup, on a Monarch 18" Model BB lathe:

1. Face
2. Countersink hole
3. Turn OD
4. Turn shoulder
5. Neck
6. Chamfer back edge
7. Rough thread
8. Finish thread
9. Chamfer thread

Actual machining time—5 min., 25 sec.

Precision . . .

In One Single High Speed Operation



Propeller hubs being spline broached.

Only by broaching can these propeller hubs be made by a single operator at one time on one machine. This is but one of the advances that Lapointe has added to modern machine production by broaching.



Lapointe horizontal machine spline broaching.

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HUDSON, MASSACHUSETTS

The Foremanship Forum

By EDMUND MOTTERSHEAD

Part X — Farm Labor and War Production

ONE of the toughest problems facing us today is food. We not only have our own large population to feed but we must provide food for our armed services in all parts of the world. In addition we are also pledged to help feed our allies and countries occupied by our forces, as a part of our program of world rehabilitation.

Of all the tough wartime problems facing the farmers who must produce the food, the toughest one is—from where are we going to get the people to raise all these essential farm products.

"All of us know the underlying reasons for the shortage of manpower on farms. Every million men added to our fighting forces means a million men taken out of the farm and city labor forces. There isn't any other way to build an adequate army and navy. At the same time, our troops and our allies need munitions, so there is a greater need than ever for factory production. Even more people have left farms for city jobs than have left farms for the armed services," said Secretary of Agriculture Wickard, in a recent radio address. This is supported by the license plates from rural sections to be found in the parking lots of any war production plant.

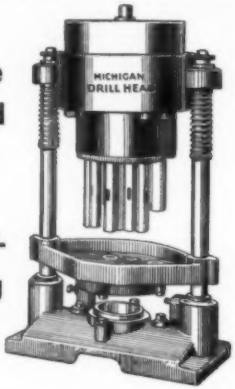
From the standpoint of the farmer who is seeking workers, it looks in many respects as if the Army doesn't get 'em, the war factories will. This year, the farms of the country have nearly a million less workers than last year and are being called upon to produce greater quantities of food stuffs of all kinds than ever before.

Why and how does this concern the industrial employer? In two major ways:—from the standpoint of food and from the standpoint of his own supply of labor.

Food is as essential to the industrial employer, or rather to his workers, as it is to the armed forces. Men and women, young and old, of whatever race or skill, manning jobs in war production plants, must have good food and plenty of it to maintain health and strength to do all the jobs. There is no



6 Spindle Head and Bushing Plate with Self-Clamping Fixture



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These patterns all made with straight-cut knurls.



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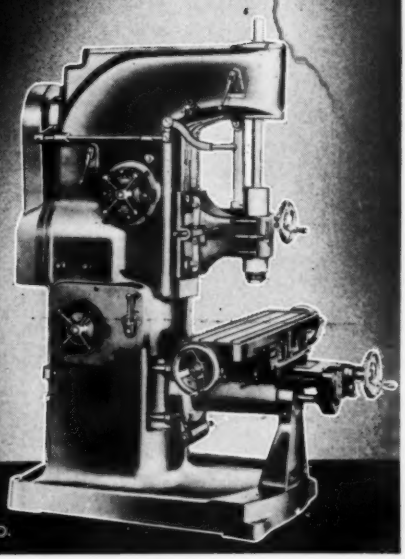
question but that the jobs must be performed so that our fighting men will be equipped. The shipping situation has brought us sugar rationing. Some people have thought that American beet sugar production could replace the lack and make rationing unnecessary. But, entirely apart from industrial demands upon the beet sugar industry for alcohol and other industrial needs, lack of farm labor has been a factor in the situation. Rationing of gasoline and rubber have had their effects. Transportation of farm produce, especially truck farm produce, is not what it was in peace times. Other food shortages are appearing. Essential metals formerly used in the canning industry are no longer available. While glass and paper containers are making some replacements, the fact that foods can no longer be canned, stored and shipped as formerly, makes new demands upon the farmers. They must produce greater quantities of different products than before, change their production practices, accommodate themselves to many new conditions. And most of the difficulty is labor-shortage.

Meat is under the gun too, due in part to heavy demands of the armed forces and lend-lease commitments upon our stockyards, and due also in part to lack of skilled farm and ranch help, needed to tend cattle and build meat production. If employees of industrial plants are to have sufficient food for a balanced diet to maintain health and strength, industrial employers must take into consideration the simple truth that farmers must have workers, too. A man working in a war plant is eating instead of growing food. Somebody must do the growing, too!

From the standpoint of his own labor supply, the industrial employer also has a stake in the farm labor problem. Traditionally, many of the best workers in industry come from farms. If I am not mistaken, normally some 37% of the industrial labor force has come from farms at one time or another. However, when as high as 50% of the labor force comes from farms, a dangerous situation develops for the farmers—and hence the "eaters"—of the country are

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Room 50 Trico Building
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concerned. We are rapidly approaching that point. The industrial employer needs to get a little better balanced picture of the whole manpower problem.

Manpower is essentially a local problem to be met by using local people to the greatest possible degree. By "local people" I mean residents of the city in which the plant or factory is located, not farmers in the surrounding countryside. In the first place, transportation is such today that workers cannot easily travel to and from the farms every day. If they must leave farms for work in town, they must live in town. That complicates the housing problem. Many towns are filled up, right now. There is little or no room for additional workers and their families, unless additional dwellings are built. That simply means diversion of many critical materials and much labor which could better be expended on other phases of the war effort. The third consideration is that when farm people apply for work in factories, chances are that they are physically healthy, strong, and extremely eligible for duty in the armed services. If farm labor must be taken at all, let it leave the farms for the Army rather than jump around two or three times from farm to factory and then to the army, leaving instability in its wake each time. The industrial employer will have greater stability and better luck by hiring residents of his own town. They already have a stake in the community and will not be prone to leave him. This is preferable to hiring people who come from farms in search of higher wages.

In Directive No. 14, the War Manpower Commission specifically recommends that: ". . . any employer who is not a dairy, livestock and poultry farm operator refrain from hiring or soliciting for the purpose of hiring, any dairy, livestock or poultry farm worker or operator, unless such worker or operator has been referred to him (the employer) by the U. S. Employment Service. The War Manpower Commission will prescribe standards and procedures for such referrals." In other words, Mr. Industrial Employer, "lay off" the farm boys. Except in a few cases, if they

Severance TOOL BOY shipping container insures delivery of your tools in perfect condition . . .



Whether you have ordered new Severance Midget Milling Cutters or sent in your worn tools to be Reground, you can be certain they will arrive at your plant in perfect condition. Tools shipped in the new Severance Tool Boy shipping container cannot touch one another—no matter how roughly the package is handled enroute. In your plant the Tool Boy serves as a handy container for dull cutters and can be used again for shipping tools back to Severance for regrinding.

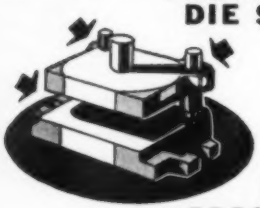
Yet the Tool Boy is only one of many advantages you get when dealing with Severance. Because Severance Midget Milling Cutters are hardened to 63-65 Rockwell C, then ground by hand from the solid they cut clean, sharp chips and speed up the finishing of any metal, wood or plastic pattern, casting or part.

Because of the precision and care with which dulled and worn tools are reground at Severance you get tools as good as new at a fraction of new tool prices. Write today for complete facts.

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SEVERANCE TOOL INDUSTRIES, INC., SAGINAW, MICH. •
PLANTS IN LONG ISLAND CITY, N.Y.; DETROIT, MICH.;
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Precision ground top and bottom—Substantially ribbed. 4 table quadrants calibrated 0 to 90° each. Friction loaded worm dial graduated in 240 minutes. Overall height 2¾". Free folder!

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Head swivels and locks from 10° below horizontal to 10° past perpendicular. Spindle taper No. 9B&S. The 3 index plates provided will divide all numbers to 50 and all even numbers to 100 (except 96T) Write for bulletin.





MACHINERY MANUFACTURING COMPANY
Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS AND JIG BORERS, SHAPERS and GRINDERS

don't stay on the farm, we need 'em in the Army.

Now, there is sound reason for all this, and it is the purpose of this article to give you an overall picture of what the farmers are up against, and what WMC and other government agencies are doing about it, with cooperation of farmers.

Paul V. McNutt sometime ago warned that this year's (1943) farm labor problem would be critical. Increased lend-lease shipments, the growing size of our army and navy, and America's pledge to feed the half-starved population of countries freed from the Nazi yoke, will make tremendous demands on our farms. We must produce more food than ever before. We will have to produce it with less labor. Our experience during 1942 proves that we can do it. Nowhere have we been able to uncover evidence of any important crop loss due to manpower shortage. On the contrary, not a single basic product of the farms was produced in less quantity in this year than last. Total farm production was nearly 12% greater than the all time high of 1941. Net farm income for 1942, including government payments, is estimated at nearly $9,800,000,000—about a billion dollars more than the record of 1919.

The uniformly good weather deserves a lot of credit for this huge yield. But government efforts to recruit farm labor and the splendid cooperation of many communities and individual farmers also had a lot to do with it. Thru October of 1942 the U. S. Employment Service placed nearly three million farm workers—60% more than during the same period of 1941. Despite transportation shortages, nearly 12,000 farm workers were moved under a joint Farm Secretary Administration—Employment Service Program from one area to another to meet emergency demands for seasonal labor. In many parts of the country, whole communities turned out to harvest perishable crops. And many farmers cooperated by raising wages, providing transportation and housing, and by hiring inexperienced people.

Under a plan for hiring domestic and foreign labor, Mexican workers were

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$2.50 EACH

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Each Industrial Diamond Tool combines precision manufacturing methods with Blue Prints specifications. Every Diamond used in these tools passes the most rigid inspection for hardness, ideal shape, and durability.

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provided for the California beet harvest, Chicago workers for the Yakima Valley apple orchards of Washington, and Kentucky workers for the sugar beets in Michigan and fruit and vegetable farms along the Atlantic Coast. This plan can work well everywhere if all parties abandon special interests and concentrate on getting the necessary crops in. If it does not work, however, we will have to try something else. Farmers may be certain that the government will take whatever steps are necessary to provide enough labor for 1943's record agricultural goals.

One out of every nine jobs in American industry and agriculture has been classified as vital to war production in a comprehensive listing of essential activities and occupations made public in November, 1942. About 3,000 occupations are included on the lists. They were prepared especially to guide local Selective Service Boards in determining occupational deferment and to aid U. S. Employment Service in determining which activities have prior claim on workers available for placement. In addition, an index to products, facilities and services, necessary to maintenance of the 35 general classifications of essential activities, has been prepared.

The only occupations included in the list were those which met both of two standards: (1) Those requiring a training period of at least six months before an untrained worker can reach reasonable proficiency in the job. (2) Those necessary to performance of the particular activity. Even though an occupation is a necessary part of a given activity, it is not on the list if a man can be trained to replace another in less than six months. Similarly, occupations which require a training period of longer than six months, but are not considered strictly essential, are not on the list, either.

The new master Lists of Essential Occupations contain, in one form, all available material and decisions relating to the subject. They are available in every local U. S. Employment Service office, and can be used by both industrial employers and farmers seeking workers.



Mr. Gordon, You've Got Something There!

And the curious thing is that he had!

That incredible bandwagon is actually the missing link between the Iron Horse and a dray horse. It combined the best features of a locomotive — steam — and a quadruped — *legs!*

For a horse's legs, brother Gordon reasoned with stirring logic, had always been the extremity of efficient hauling power, hence they always would be. So he built *mechanical* legs for his dream of motive power. . . . The spirited vehicle pranced itself to pieces, and Gordon's dream was ended.

Yet, in 1824, David Gordon had something that might have made mechanical history. It was *traction* that he was striving for, never dreaming that the wheels alone would give enough of it to pull his steam-driven carriage . . . while the regrettable legs on that hybrid hack were remarkably close in principle to the caterpillar-type of traction used today on tanks and tractors!

This story has a modern moral. For every engine and every machine that runs today represents many failures, many successes — and many problems that are still in the process of being solved. And in the solutions of those problems lie the great discoveries of the future!

Today, Jones & Lamson engineers and service men are working with leading technical men in virtually every industry and in hundreds of plants, from the largest to the smallest, helping to solve those problems. And behind them is a background of machine tool engineering that spans more than a century of our industrial history — since the days of David Gordon.

No matter what your problem — or when — Jones & Lamson engineers are at your service.

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HIGH SPEED VERTICAL
MILLING and JIG BORING MACHINE

Truly the handy-man of the shop, this compact little machine takes . . . and efficiently performs . . . a greatly diversified number of jobs and frees your larger machines for heavier work.

The direct micrometer setting is so simple that work can be accurately machined to pre-determined depths without pencil figuring . . . without error. Eight spindle speeds, 275 to 4250 r.p.m., ample table size (7"x17½") and small floor space (18½"x20"). A carefully designed machine, well built and well able to earn its keep right from the start.

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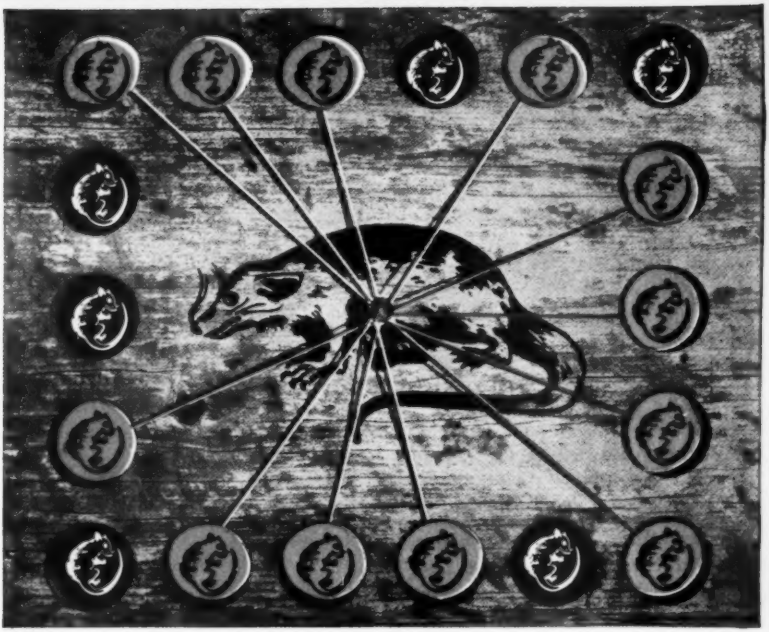
War Manpower Commission in cooperation with the Department of Agriculture, now has a definite program trying to cope with the farm labor problem. The program, announced in broad detail by WMC on October 28th, 1942, following its approval by the WMC's Management - Labor Policy Committee was described by Secretary of Agriculture Claude M. Wickard as "an effort to ease the strain where it is threatening the most damage now." Wickard, in a speech delivered over the CBS network, characterized the farm labor shortage as a "wartime situation that just can't be completely cured." He said that the fundamental aims of the program are:

(1) Cut down the rate at which skilled farm operators and workers are leaving dairy, livestock, and poultry farms.

(2) Recruit new help to work with the skilled labor remaining on the farms.

To help accomplish the first purpose, the Selective Service System has asked local boards to give occupational deferment to necessary men who are working on essential dairy, livestock, and poultry farms. To bring about further stabilization, the Army and Navy will continue the policy of not recruiting the skilled workers from those three branches of agriculture. In addition, all industrial employers are being asked not to hire men away from such farms. The whole program is concentrated in the dairy, livestock, and poultry farms because of the "great national shortage of manpower under which neither farms nor factories can hope to keep all the skilled people they could use, and because of the vital wartime importance of foods from these three types of farms.

One of the most important parts of the program is that a farm with a minimum of eight cows, or their equivalent, can qualify as an "essential farm" by increasing its stock to 10 cows or the equivalent within three months, and to 12 within the following three months. The Department of Agriculture is giving the farmers all the help it can in getting more livestock and equipment and in generally building up production. If a man's farm is not suited to larger



Nature's most tragic mistake

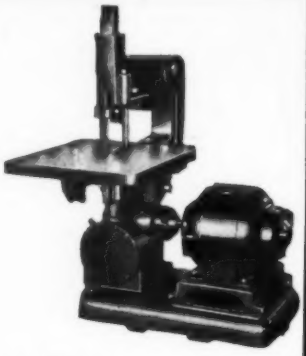
THE POSSUM'S LITTER consists of 18 babies. But mother possum can only accommodate 12. At birth, there's a mad scramble for the 12 nipples, and the first arrivals don't budge for 6 weeks! The other 6 babies just look on... and die of starvation.

What an ironic circumstance! A mother forced by fate to watch her own babies starve! And what a pointed illustration of the ruthlessness of Nature. In Nature and in business, the fight for survival is equally vital. Failure to keep abreast of changing conditions has invariably doomed the less alert industrials to business death.

Because they affect almost everything we touch, machine tools will be more necessary than ever in the post-war era. Machine tools are essential today to the output of the food you eat, the clothes you wear, your automobile, your vacuum cleaner, your washing machine, your refrigerator. Machine tools not only create new industries, but they create employment. They are largely responsible for our present way of life... unequalled by any other country in the world.

In our post-war era, Cone Automatic Multiple Spindle Lathes will be even more essential than they are now. Their unique advantages will help bring us all higher standards of living than we have ever known before.

CONE Automatic Machine Company, Inc., Windsor, Vermont



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DIE MAKING MACHINES

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operations, the Department will try to help him locate a better farm which can be classified as essential. If a skilled-wage hand is on a farm which cannot qualify as essential, or if he is not doing work that can be classed as necessary, the Department will cooperate with the USES in helping him find work on a dairy, livestock, or poultry farm where his efforts will count for more, and will help to move him there.

One part of the plans made by WMC in collaboration with the Department of Agriculture, to provide labor for the record agricultural production in 1943, calls for a highly mobile army of experienced full-time farm workers, aided by corps of local volunteers, to meet peak season demands. This part of the program includes:

(1) Full time continupus employment of mobile groups of experienced farm workers, transported at government expense from one area to another as the crops mature.

(2) Relaxation of local barriers between states which now restrict complete mobility of labor.

(3) Transfer of experienced farm operators and workers now on substandard lands to productive lands in areas of labor demand.

(4) Expansion of U. S. Employment Service farm placement machinery for direction of farm labor movement and full scale mobilization of local volunteer groups.

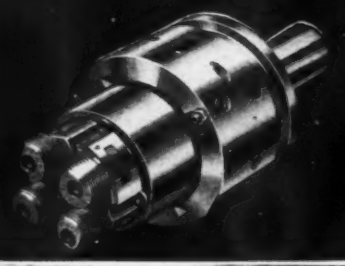
(5) Adjustment of farm wages to bring incomes of farm workers more nearly into line with earnings of industrial workers.

(6) A farm labor training and management program, now being developed by the Department of Agriculture and the U. S. Office of Education. This will enable farmers to make most effective use of fewer numbers of experienced workers thru expert supervision, training and upgrading.

The answer to the problem boils down to planning in advance for labor requirements plus cooperation of local community groups, to meet seasonal peaks in the labor demand. Let's take a quick look at what one of the state

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. . . are applicable on both stationary and rotating spindle machines. They maintain accuracy over long runs, on tough alloys and stringy stock, and on close-to-shoulder work.

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. . . determines correct amount of Circular Chaser grind, and checks precision after grinding. Chasers may be ground through 270° of circumference—*they last 10 to 30 times longer.*

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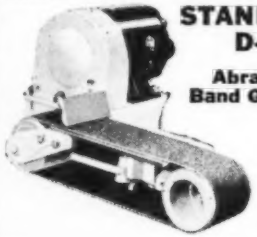
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This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4 x 36¼" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW BOOKLET ON FINISHING—WRITE TODAY

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USES offices is doing about the problem.

In Illinois, the state office of the USES breaks down the seasonal labor demand by counties and lists the labor required by crops on a chart such as is shown in Fig. 1. Information on the chart is compiled by having each farmer in the area list his crops and acreage devoted to the crops for the coming year, the number of workers required to handle the acreage and workers available on the farm without importation of help. This information is then totalled and compiled together with an indication of the expected crop season to make up the chart.

As can be seen from this hypothetical illustration, the problem of the USES in providing help to meet seasonal needs of Doakes County begins the first week in April, when 10 extra people will be needed for the asparagus crop, continuing for the entire month of April. The first of May, these 10 people will still be needed, plus some 500 to help with the sweet corn. The second week in May an additional 800 persons will be required for the strawberries, making 1810 provided by the USES. This continues until end of the last week in May. The first week in June, the asparagus and strawberry crops are finished and the people released, the 500 in the sweet corn fields remaining for two more weeks. The second week in June, 500 are needed for peas, which need probably can be met from among the 800 already released from the strawberry crop. The third week in June, sweet corn is all in, and oats comes next. But oats require no additional outside workers. So the placements of the USES for that period remain only as the 500 working on the pea crop. The fourth week in June, the apples require attention. Some 1700 workers will be in the county. This requirement of 1700 people lasts clear through the first week in October except for a gap of about three weeks in August, when these people might be shifted over to another county to handle another crop. Seed corn comes in in July for 25 extra workers, and sweet potatoes require outside help to the extent of 75 hands in Sep-

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BOX AND PAN BRAKE—
Forms boxes or pans from one piece of metal. A straight brake as well as a box brake. Ideal for experimental shops.



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Improved to meet modern needs. Efficient and dependable — sturdy and durable.



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Indispensable wherever a volume of heavy plate work is done—forms a great variety of bends and shapes without dies.



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We manufacture any type of die required for bending presses. Our die engineers will work on any type to meet your needs. Submit blue print or sample of work.

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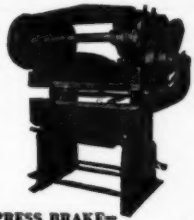
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ALL CHICAGO BRAKES are built of rolled steel welded sections which insure great strength, accuracy and long life. They are the most modern tools in design and workmanship to fit today's need for fast production sheet metal working machinery.

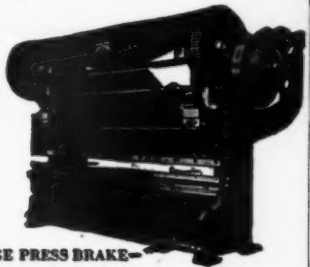
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Aside from the CHICAGO line, we have built many special machines for intricate bending operations. Take advantage of our many years' experience by sending us any difficult bending problem you have.

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SMALL PRESS BRAKE—
Compact, powerful money-saving production unit. Replaces cumbersome costly machines that are expensive to operate. Uses same dies as larger machines.



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★ WITH a Rousselle Victory Vise, accurate set-ups are simple — and fast! This is due to many features such as complete, easy-to-read graduations around the entire dial on the broad swivel base—the two convenient locking screws that hold your swivel setting securely—the lock nut on the main screw—extra ruggedness in the broad base, center pin, jaws, ways and screw—all of which assure long-lived precision. The hardened steel screw nut is removable and although the bearing areas on ways and sliding jaw are oversize, a special take-up plate provides constant alignment regardless of wear. Jaw plates are tool steel, hardened and ground. Point-by-point superiority in every detail has made the Rousselle the choice of experts. Get full data in Bulletin MT-63. Write today.

PROMPT DELIVERY — PRIORITY CERTIFICATION MUST ACCOMPANY ORDERS. Dealers—Write for dealership plan.

Rousselle Victory Vises are made in four sizes.

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BENTON HARBOR, MICH

EXHIBIT A - SEASONAL CHART

County DOAKES
Office Serving PODUNK

CROP	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ACREAGE 1941	ACREAGE 1942	WORKERS USED 1941	WORKERS NEEDED 1942	WORKERS AVAILABLE WITHIN 10 MILES 1942	OUTSIDE WORKERS NEEDED
	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4	WEEKS 1 2 3 4						
ASPARAGUS													250	300	610	610	600	10
SWEET CORN													3,480	3,940	5,000	5,000	500	500
STRAWBERRIES													630	600	1400	1300	500	800
SEED CORN													600	600	150	150	125	25
OATS													8,200	9,100	50	50	50	0
PEAS													2,400	2,400	600	600	100	500
APPLES													2,700	2,600	3,000	3,700	2,000	1,700
SOY BEANS													5,210	9,600	200	205	200	75
SWEET POTATOES													300	300	54	54	54	0

WDC-ES-10144-A
Rev. Jan. 1942



Speed up Production

WITH THIS NEW Saw-way MODEL M-H-2 INTERNAL GRINDER

OFFERS both hand and hydraulic table operation . . . each independent of the other . . . a new and exclusive Saw-way feature . . . permits use of both hand and hydraulic feed in combination on the same job in the same setting . . . other special features that help speed up production . . . send for literature giving details and complete specifications.

Saw-way INDUSTRIES

Machine Tool Division

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A Really

UNIVERSAL VISE

for Grinding, Drilling and Milling



The DELTA "UNIVISE"

Saves time and assures more accurate work! Rigid and massively built, this first truly universal vise has four component parts. Each part can be independently rotated and set with its separate circular scale of 360°. Thus there are four distinct planes of adjustment—which means that any angle can be easily and speedily obtained.

The Univise eliminates guess-work and errors even with inexperienced help. For duplicate grinding, the vise can be quickly and accurately returned to any angle by simply making a record of the settings. Settings can be made direct from blue prints. Univise is 5-13/16" high, 6" wide, 7¼" long. Jaws take tools up to 1½". Fits any surface grinder or tool grinder. Has detachable keys on base which can be removed to permit use on drill press or other machines without table slots, or on a magnetic chuck.

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tember. The last of the season finds the 75 sweet potato workers remaining.

This information is tabulated along in January for the work of the following summer. Naturally, frost, rains, blight, and whatever can happen to the farmer will change the picture. A week before the scheduled time, farmers may call in and report a bumper crop and need of several hundred more people. Or they may call in and cancel the request for help due to crop damage. The whole thing represents as fine and tricky a problem in dispatching as any experienced railroader would want, plus the ever variable factors of human beings, weather and nature.

However, it is a system which has proved its merit. High school boys, young men and women from small towns, all sorts of people are recruited and transported about as necessary to help skilled workers on the spot take care of the load.

In advance of requirements, local vocational schools will arrange with farm implement companies to train 25 or 30 or whatever number is required as skilled operators of various types of farm machinery.

Housing problems are met with all sorts of temporary solutions. Former CCC camps, girls' camps, boys' camps, summer lodges, anything which will provide a roof and a fire for a few days or weeks, all are enlisted to house temporary workers long enough to get them on the grounds where they are needed.

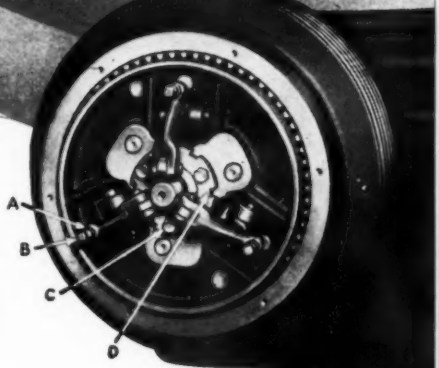
Transportation, in most cases, is furnished by the government, altho the farmers help and the workers also provide a great deal. Possibly one of the most dramatic and typically American community events is when, in season, shops and schools close down and the whole town turns out to help local farmers get in the crops.

The new farm manpower program is an effort to ease the strain where it is threatening the most damage. Milk, meat, and eggs are vital wartime foods. The total demand is even larger than production right now — larger than any production we can hope for in 1943. More than that, they are year-round enterprises. If livestock and dairy herds, or poultry flocks become depleted now

I'm Tellin' You...

No. 10 in a Series of Tips on "Keeping 'em Turning" by Tom Tailor, 40 years at LeBlond

Any lathe requires adjustment from time to time. How often depends on the type of operation and sometimes on the operator. Although it is seldom needed, the clutch is one spot to watch. If I tried to explain the "whys and wherefores" of the mechanics involved in the LeBlond clutch, it would take several of these pages, which the "front office boys" assure me can't be bought with marbles. So without going into details, here are two symptoms of trouble and their remedies:



Loss of power — When the lathe slows under cut and the flow of power is irregular or jumpy, it's a pretty fair sign that the clutch is slipping.

Here's the remedy:

1. Put clutch in engaged position.
2. Drain oil through plug at bottom of clutch cover.
3. Remove the six screws to take off cover.
4. Loosen three lock nuts on clutch fingers (A).
5. Turn three screws equal degrees to the right (B).
6. Tighten three screws (B) until belt slips when spindle is blocked. With even adjustment, push rod will run dead center.
7. Tighten lock nuts (A).
8. Replace cover, refill with oil.

Hot clutch box — When there is too little clearance between the clutch plates while the lathe idles, friction overheats the non-circulating oil, breaking down its lubricating properties. When this happens, the cover plate will be hot to the touch.

Here's what to do:

1. With the oil drained, cover plate removed and clutch engaged, remove three screws (C).
2. Use a spanner wrench to tighten lug nut (D).
3. After checking manual for exact number of turns, back off lug nut. Check with feeler gauge the space specified between clutch hub and adjusting nut.
4. Replace screws (C) to draw clutch assembly tight against nut in proper operating position.
5. Replace cover plate and refill with oil.

ARMY E NAVY

THE R. K. LeBLOND MACHINE TOOL CO.
CINCINNATI, OHIO

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Use Them Over and Over



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Measured by the number of times De-Sta-Co Spacers can be used, they are the lowest in cost of any spacers you can buy.

Made of metal, they are not affected by oil or heat.

Use for quick set-up of milling machine cutters and wherever low cost, accurate spacing is needed. Stock sizes .001" to .125" thick. Specials, any length, cut from bar stock, ground to decimal.

TRIAL ASSORTMENT—enough for average use on one machine sent for $1.00. Give arbor size.

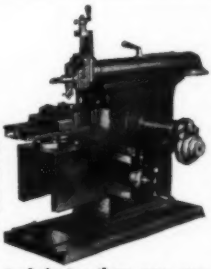
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because of a lack of skilled farm labor, it would take a long time to build them back again. Perhaps they never could be fully restored.

However, no matter what program is devised, farmers in 1943 will have to get along, more and more, with many kinds of help they have not been accustomed to using—more women and girls from cities, more older people, high school boys and girls. That is where the industrial employer can cooperate—by using as few people from the farms as he can, by accepting for employment only persons cleared thru the USES, by stabilizing his own personnel thru using actual residents of his own community, and by getting that broader view of the manpower problem as a whole which will make it possible for both industry and agriculture to get along—not with all the skilled help they want or can use—not with the soundest and healthiest of men—but with the people who are right at hand and who can be trained to man the jobs behind the men at the fighting front.

FIT THE SHAPER TO THE JOB!



Make any small shaping jobs pay by using this accurate Lewis 10" Metal Shaper and relieving big expensive tools for other needed services!

You can build this tool faster than you can get delivery on a completed one. Plain or semi-finished castings, necessary materials and blueprints are furnished on low priority—at about 20% the cost of a finished Shaper of equal ability. Only simple machining is necessary . . . completion is easy.

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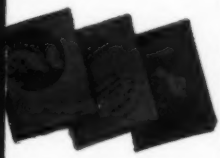
TO HELP FURTHER INCREASE WAR PRODUCTION



★ CARBIDE TOOL TRAINING COURSE

To help carbide users in war industries speed the training of new men, apprentices, and those being converted to carbide tool use in the metal working trades, Carboloy Company operates an instruction course at its Detroit plant for the training of carbide users' key men. These men receive one week's training in the fundamentals of design, brazing, application and maintenance of carbide tools, through actual shop practice, discussion periods, and training film showings. The men return to their own plants with a basic knowledge of carbide practice—and recommended procedure for training their own men, assisted, when desired, by our field engineers.

During the two years in which this training course has operated, carbide users in 39 states and 3 allied countries have received this training. The course is operated without charge as a service to war industries. A similar service is available to cartridge case die users—to instruct in the finishing and servicing of carbide dies for drawing cartridge cases.



★ INSTRUCTIONAL LITERATURE

Each year Carboloy publishes comprehensive engineering bulletins covering latest carbide practice. Current booklets include D-113-R—finishing and servicing cartridge case dies—GT-133—carbide tool manual of design, brazing, grinding, application—GT-127—grinding carbide end cutting tools.



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To help in the gigantic task placed upon industry and government, of training new thousands of workers, a set of six carbide training films—as described below—was made available by Carboloy to industry last fall—to provide detailed training in all phases of carbide tool use. (Booklet GT-151.)

Film—"WHAT IS CEMENTED CARBIDE?"

Film—"CHIP BREAKERS"

Film—"DESIGNING CARBOLOY TOOLS"

Film—"GRINDING CARBOLOY TOOLS"

Film—"BRAZING CARBOLOY TOOLS"

Film—"PUTTING CARBOLOY TOOLS TO WORK"



These six films are available at approximate print cost

★ FIELD SERVICE

Since the day cemented carbide was first introduced—as a new, strange, "revolutionary" tool material—Carboloy has maintained a large, active staff of experienced field engineers to assist users in all phases of carbide tool practice. As an example of the type of service these men render, in one year alone they trained more than 5,000 men in users' plants in the correct methods of rapid carbide tool grinding.

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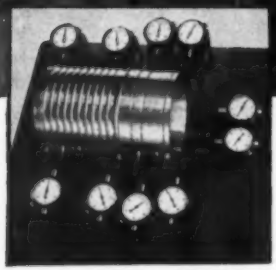
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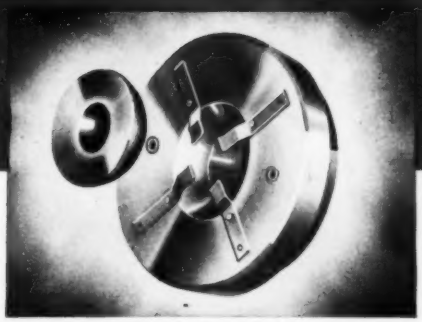
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Sometimes, however, it is impossible or impractical to make this provision and so a self-aligning faceplate should be used. A faceplate of this type is illustrated above. The hemisphere is held in the socket in the faceplate by spring steel fingers which allow it to move sufficiently to correct any misalignment in the set-up. The cutting pressure of the broach is sufficient to force the part into alignment without undue strain on the broach.

The most common application of a self-aligning faceplate is in broaching rough castings or forgings where there may be considerable variation in the position and condition of the locating face. In fact, this type of set-up should be used wherever there may be doubt about the squareness of the starting hole as the cost is negligible compared to the cost of replacing a broken broach.

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Producing Small Machine Tools

Part II — The Lathe Carriage

By H. A. FROMMELT*

IN A preceding article, the milling operations necessary to produce a bed for a 10" lathe were discussed. In this presentation, the milling operations performed on the lathe carriage are detailed. The function of the carriage is clearly apparent from Fig. 1 which presents the assembled lathe. This part, with the dovetails and other ways after having been milled are shown in Fig. 2. The set-up for this operation is shown in a general view in Fig. 2 and in a close-up in Fig. 3. In this operation the top and dove-tails of three carriages are milled in one pass.

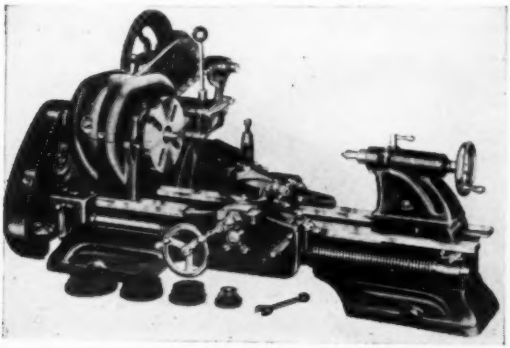


Fig. 1—Atlas "F" Series 10" Backgeared Screw Cutting Lathe with instantly reversible power cross feed and power longitudinal feed. Swing over bed is 10¼"; over carriage 6⅝". Spindle speeds are 16 in number, ranging from 28 to 2072 rpm. Four bed lengths are available.

The overall machine set-up and arrangement are shown in Fig. 2. A bed type milling machine is equipped with horizontal and vertical spindles set in specially designed heads. A horizontal spindle carries two cutters which remove stock for the dovetail. Three vertical spindles, mounted on a bridge, operate two dovetail cutters and a half side mill. The bridge and vertical spindle construction are shown, close-up, in Fig. 3. The necessary cross-wise adjustment for these vertical spindles, both in general and detail, are presented in Figs. 2 and 3.

The fixture designed for this operation accommodates three carriages or workpieces. Each piece is clamped simply by tightening two "hex" nuts, visible in both Figs. 2 and 3. The overall length of each carriage is 9-5/16"; the total length of the fixture is therefore approximately 30". The base of this fixture constitutes the guide for this operation, namely, the milling of the top and the dovetail of these lathe carriages, which is the first machining operation on this piece.

The two solid half side cutters on the horizontal spindle are 6" in diameter and of high speed steel. The two solid dovetail cutters, one each on two ver-

*Director of Industrial Research, Kearney & Trecker Corp., Milwaukee.

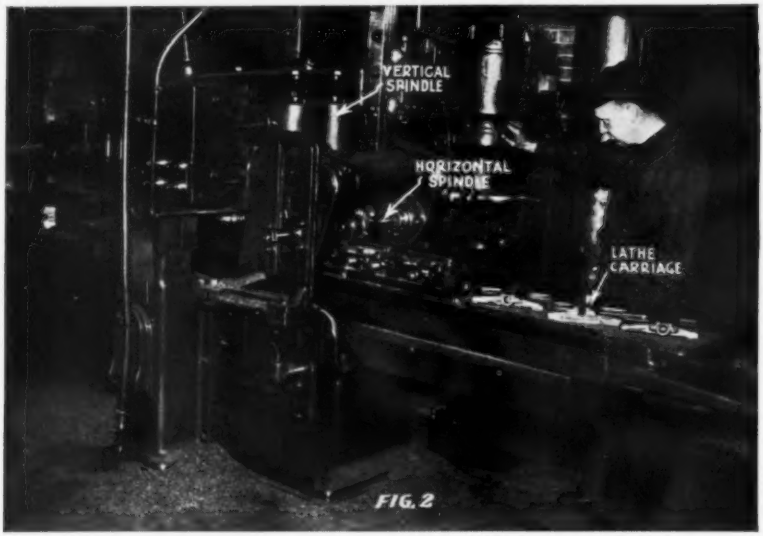


FIG. 2

Above is shown the overall machine setup and arrangement. Below is a closeup of the cutters and holding fixtures.

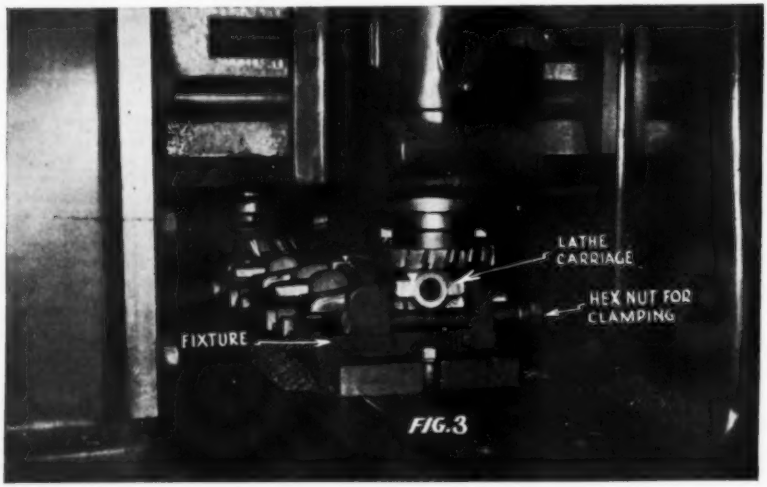
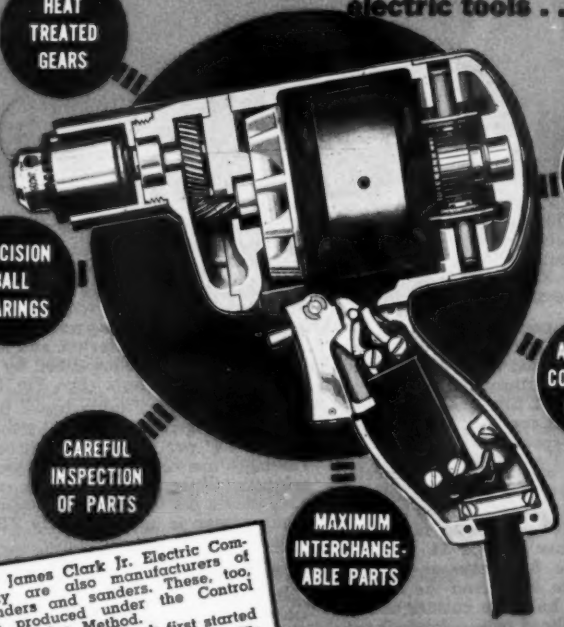


FIG. 3

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FIG. 4

tical spindles (See Fig. 3), and 6" in diameter, are also of high speed steel. The one face milling cutter on the rear vertical spindle is, likewise, high speed steel, and 6" in diameter.

The speed of both the horizontal and vertical spindles is 76 rpm. Under these conditions, the speed in surface feet per minute of these cutters, both horizontal and vertical is 108. Since the carriage is of cast iron, this represents good practice with high speed steel.

The number of teeth in the dovetail cutters is 16. At a feed rate of 8.4" per minute, the chip load per tooth is easily calculated as .007". Since the number of teeth in the face mill is 14, the chip load, using the feed rate of 8.4" per minute becomes .008". And the number of teeth in the half side cutters used to remove stock ahead of the dovetail cutters is 16; which at a feed rate of 8.4" per minute means that a chip thickness per tooth per revolution (chip load) is calculated as .007".

The depth of the rough milling cut is 1/16" or .0625". This is reduced to .03125" (or 1/32") for the finish milling cut. No further finishing operations are performed on this lathe carriage on the top and dovetail ways.

The fixture for this operation—a rigid, sturdy, holding device, is similar in construction to a vise with a solid and a moveable jaw. The workpieces are quickly and easily inserted, and located. The clamping is accomplished by tightening two "hex" nuts (See Fig. 3).

The total overall table travel for this cutter arrangement is 60". At the feed rate of 8.4" per minute, the three lathe carriages are completely machined in 7 minutes. Since the production rate is 18½ pieces per hour, the unloading and loading time is approximately 2.5 minutes.

The Lathe Carriage (Bottom)

In the foregoing, the milling operations necessary to machine the top and dovetails of the carriage were discussed. We shall now consider the milling operations on the bottom, face, front and back ends of this same lathe carriage.

The interesting machine set-up for these operations, all performed in one pass, are accomplished with a bed type milling machine equipped with both vertical and horizontal spindles. The

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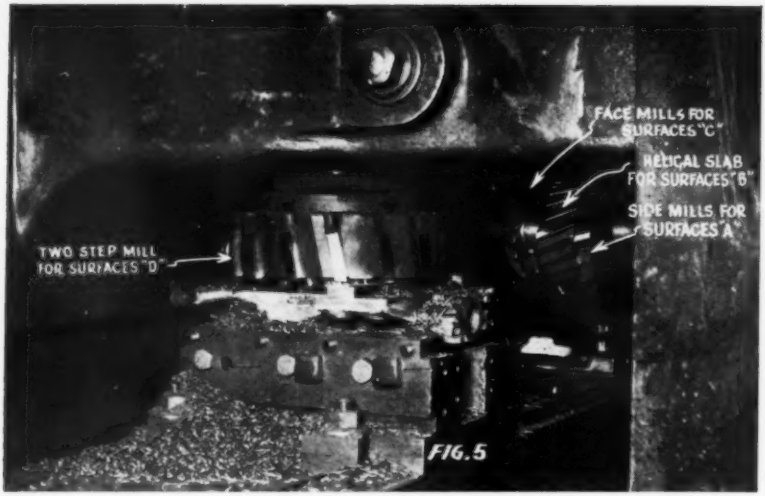


FIG. 5

general view of this assembly is shown in Fig. 4, in which the horizontal spindle is clearly visible, while the vertical spindle with its cutter assembly is clearly shown in a close-up view in Fig. 5.

Five cutters are mounted on the horizontal spindle as shown in Fig. 4. The side mills are used to machine surfaces "A," the front and back of the carriage (See Fig. 6); the helical slab mill is used for the flat surface marked "B." The face mills are used to mill surfaces marked "C," Fig. 6. The two step cutter on the vertical spindle is used for the machining of surfaces marked "D," Fig. 6.

All of these cutters are of high speed steel; both the vertical and horizontal spindles revolve 62 rpm, while the feed rate is 5.5 inches per minute. Since the two side mills are 8" in diameter and the rpm is 62, their linear velocity is 130' per minute. The helical slab mill is 4" in diameter and with the same rpm, namely 62, its linear velocity is 65' per minute.

The number of teeth in the side mills is 28; at a feed rate of 5.5" per minute, this represents a chip load of .0032". Likewise, the chip load of the helical slab mill is calculated as .0044", since the number of teeth is 20 while the feed rate is 5.5" per minute.

The two step face mill has diameters of 8" and 5-15/16". The rpm of the vertical spindles is the same as that of the

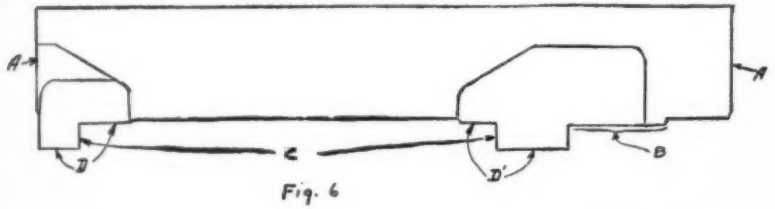


Fig. 6



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When you consider that these are the words of the engineer in charge of small tools in one of the most famous airplane engine plants; that in this specific case he was not primarily interested in what "stoning" would do, but was testing the effectiveness of various tool steels, we believe you will feel bound to investigate how much attention *you* now pay to getting greater and better output *by stoning the edges of all your cutting tools.*

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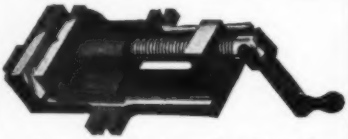
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horizontal; hence the fpm linear velocities are 130, and 95 fpm. Since these cutters have 20 teeth each and the feed rate is 5.5" per minute, their respective chip loads are .0043". The machined dovetail, as previously explained, becomes the guide for locating this workpiece in this set-up. The two "hex" nuts indicated in Fig. 4 are used to clamp the lathe carriage.

The average depth of the rough milling cut is .0625". No finishing cut is taken on these surfaces and there is no final finishing operation.

The approximate overall table travel necessary to machine these surfaces with this arrangement is 21". Hence the machining time for each piece is slightly under four minutes. Since the production rate achieved with this set-up is 10.7 pieces per hour, the overall time for each piece is slightly under six minutes. Hence, approximately two minutes are consumed in unloading and loading operations. The excellent production rate achieved for these operations on this lathe carriage is a criterion for the soundness of design, both in the machine and the fixture, as well as the correct operating characteristics established for such factors as speed and feed.

(To be continued.)

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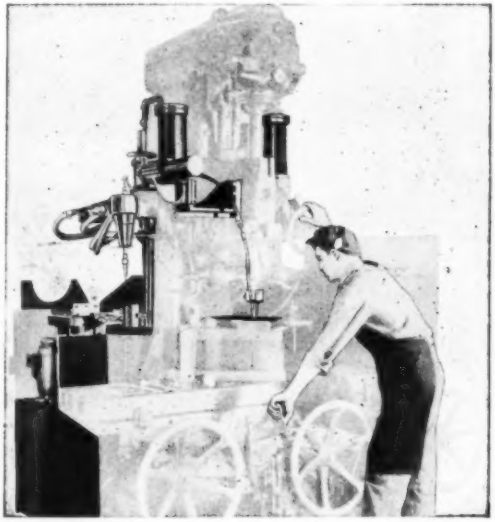
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A NEW tool grinding principle, which it is said, may revolutionize the grinding of carbide cutting tools by making unnecessary the employment of highly skilled labor for this work has been developed cooperatively by Carboloy Co., Inc., 11139 E. 8-Mile Road, Detroit, and the Edison ("Hotpoint") General Electric Co., Chicago. While the new principles have as yet been applied only to single purpose machines in use at the "Hotpoint" plants in Chicago, plans are going forward to develop more universal types of machines employing the same principles.

The need for skilled or specially trained operators for carbide tools up to now has been due to these factors:

1—Sufficient pressure must be applied to the tool on the grinding wheel to grind efficiently, but not so much that the tip will overheat, resulting in thermal-cracking.
2—The tool must be kept moving across the wheel to avoid localized overheating, to distribute wear on the wheel, and to obtain a good finish.
3—Carbide tools must always be ground toward rather than away from the cutting edge, to prevent breaking out of small particles at the cutting edge.

4—Angles to which carbide tools are ground must be held closer than is the normal practice with most high speed steel tools, if they are to operate at maximum efficiency and insure maximum life between grinds.

It is obvious from all this that a high degree of skill is required when control of these factors is delegated to the individual operator. What the new grinding process developed by Carboloy and "Hotpoint" engineers does is to remove these factors from direct control of the operator and incorporate them in grinding equipment which automatically provides the desired motions, pressure, etc.

The development originated shortly after E.G.E. undertook the brazing and grinding of standardized Carboloy cemented carbide tools as a sub-contractor for the Carboloy last year. The first machine developed was a single purpose machine to grind top faces of standard carbide tools and relieve a serious bottleneck due to a shortage of grinder hands at E.G.E. With this machine, top faces of carbide tools are ground in from 8 to 30 seconds per tool, depending on size. Experiences indicate that a good average grinding time, covering all the faces of tools produced at



Fig. 1—One of the toughest jobs in the manufacture of carbide tools—grinding of the top face—is now the simplest one due to development of a new grinding process by Carboloy and Edison General Electric. Here, Pearl Prancl, is grinding the top face of large carbide tools at the rate of 80 to 100 an hour. The machine eliminates the human element in correctly manipulating a tool and applying correct pressure against wheel.

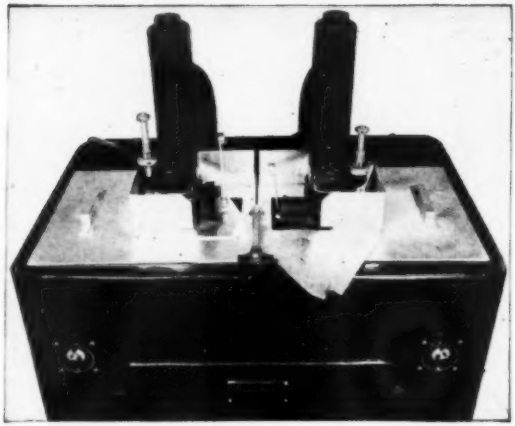


Fig. 2—Specialized single purpose version developed for sharpening special h.s.s. form tools used in large quantities in "Hotpoint" Ordnance plants.

E.G.E. is 25 seconds floor to floor—resulting in an output about six times that possible with a pedestal grinder on the same operation.

Secret of the superior quality of finish obtained on the tools is attributed to the fact that the grinding wheel, in addition to rotating, also oscillates while the tool is held stationary at the correct angle. The oscillation is in the plane of the wheel. This oscillation also contributes to the speed with which tools can be ground.

The second important principle involved is that tool is held against wheel under a constant and controlled pressure, insuring maximum grinding speed consistent with quality of finish, wheel life, heat generated, etc. Pressure applied in the E.G.E. machines is pneumatic. Construction of the device is such as to bring the tool against the wheel under low air pressure to remove jagged edges, the pressure automatically increasing to the pre-set amount and being held at that value until the tool is finish ground. Machines are provided with a simple dial control for setting the time cycle, so that all the operator has to do is to insert tool in holder and remove it when finished.

Incorporation of the automatic control pressure device has made possible another advantage. Instead of the usual type of resinoid wheels used on manual grinders, the automatic machines are equipped with metal-bonded diamond-impregnated wheels, resulting in a vastly increased wheel life. The difficulties in using this type of wheel previously have centered about the fact that they require a higher

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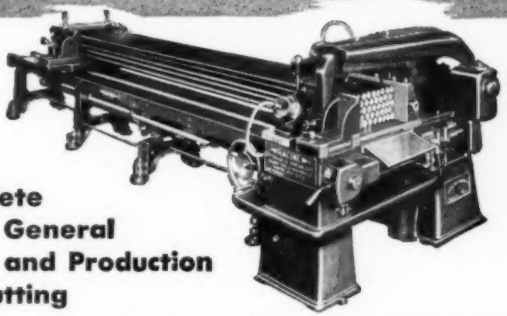
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"Vane Type—Variable Volume Pumps" operate at reduced horsepower. No relief valve required. Sizes 0-12, 20 and 30 G.P.M. at 50 to 1000 lbs. pressure per sq. in.

Racine Hydraulic Valves with exclusive "Sleeve Type" construction. Balanced Piston cannot sag. Sizes ¾ in. to 1½ in. with manual, electrical or mechanical control devices.



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RACINE TOOL AND MACHINE COMPANY

STANDARD FOR QUALITY AND PRECISION

RACINE, WISCONSIN • U. S. A.

BARKER

Wrenchless

CHUCKS

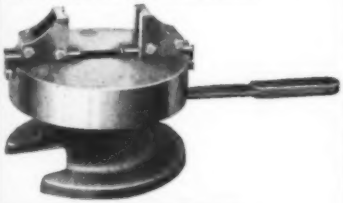
keep your lathes working — not waiting.



Made in two and three jaw types

BARKER Wrenchless Chucks can be adapted to any type of work that may be done on turrets, engine lathes, semi-automatic or pipe threading and cutting-off machines.

The BARKER Wrenchless Chuck is simple and sturdy in construction. It is compact—requires no accessories to install. It permits bar work to spindle capacity. A quick movement of the lever releases or grips the work. Well adapted for a diversified line, from small brass castings to heavy forgings. Write TODAY for full details.



BARKER

Drill Press Vise

for facing, tapping, reaming, drilling, milling operations. No wrenching is needed to remove or set the work.

THOMAS HOIST CO.

Chuck Division, 24 S. Hoyne Ave.
CHICAGO, ILLINOIS

tool pressure against the wheel for maximum grinding efficiency. This high pressure mitigated against correct grinding when tools were applied manually.

While developed for carbide tool grinding, the principles involved have already been applied by Hotpoint in a limited way to the grinding of high speed steel tools.

When "Hotpoint" was required suddenly to cease manufacture of electric ranges, one of its plants was converted to the manufacture of bullet cores. To machine these cores, a large number of single purpose specialized form tools were required which had to be sharpened daily.

While these tools were of h.s.s. rather than carbide tipped, it wass found possible to design a slightly different version of the carbide grinder to handle these single purpose tools. The results obtained with the high speed steel tools, grinding the ends only are described as equally phenomenal—eliminating need of highly skilled labor and large numbers of surface grinders.

The grinders have shown exceptional performance in the matter of wheel life. For grinding tools of either carbide or h.s.s., the machines are said to have paid for themselves in only a few months' time on the basis of grinding wheel cost alone.

Currently a number of these grinders are being put thru in production at the E.G.E. plant for use in single purpose operations, such as are involved in mass production of standarized Carboloy cemented carbide tools. Design development is also being started in an endeavor to expedite the incorporation of the new principles of tool grinding in general purpose machines.



CUB

VARIABLE SPEED TRANSMISSION

For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. *See your dealer or write* **$16.50**

(3 Types—8 sizes to choose from)

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YOU PROFIT MOST: When the TAPS you buy combine the accuracy required to meet fussy specifications with the RUGGED tool strength built into them by WINTER craftsmen. This "KNOW HOW" is your guarantee of fast, uninterrupted production on your threading job. REMEMBER! Conclusive laboratory tests show that the power required to **break** a tap is several times that which is necessary to **cut** a thread — IF THE TAP AND HOLE ARE IN ALIGNMENT!

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Four speeds: 200, 400, 700, 1,000 RPM

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Complete with standard motor, reversing control, draw-in attachment and ½" collet. Prices f. o. b., Cincinnati

Other speeds—variable speed drive, 90 to 2,300 RPM — extra	$125
Concealed coolant pump, complete, extra	$ 90
Vertical Head attachment, extra	$100

Jefferson Precision Milling Machines are built with exceptional sturdiness in every detail. They combine fast, accurate production with ease of operation. Capable of obtaining close tolerance and of handling a large volume of work. Proven ability and low-cost performance on such operations as die sinking, contour profiling, angular milling, jig boring, routing, plus practically all essential milling operations on ferrous and non-ferrous metals and plastics.

Spindle mounted in tapered Timken roller bearings. Dove-tailed slides, gibbed and hand scraped to perfect alignment. Silent, powerful V belts maintaining constant pulling power.

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6" TILTING DIVIDING HEAD

with 3 indexing plates and tailstock:

Actual swing 6". The utmost in a well balanced, rigid, accurate dividing head. Material and workmanship of highest grade and made to close inspection.

Also .... 7½" SWIVEL BASE DIVIDING HEAD, with 3 indexing plates, one rapid indexing plate and tailstock.

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ACCURACY — SPEED AND TOP PRODUCTION

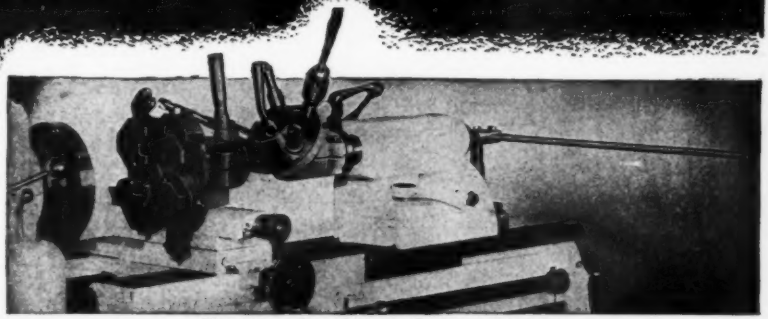


Photo above shows Jefferson Turrets on 16" lathe

5 Tool-Tail Stock Turret



PAT. PENDING

Convert

YOUR ENGINE LATHE INTO A TURRET LATHE IN 15 SECONDS

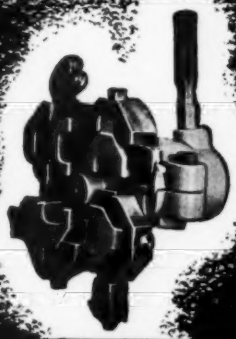
Yes it's as easy as that! You simply attach the Jefferson Tail Stock Turret, and the Jefferson Adjustable Pull Feed to your lathe as shown in top illustration.

The productive capacity of these machines will be more than doubled in many instances because there is available at all times nine different tools.

With these three JEFFERSON time saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc. without stopping the lathe or changing tools. The JEFFERSON TURRETS are substantially built, rigid and extremely accurate. Made in several sizes to fit small bench lathes up to 24" swing.

TURRET DELIVERIES IN SIX DAYS

Write for details, also literature on the Precision Milling Machine, Dividing Heads, Vises, Swing Frame Grinder, Endless Belt Sander, Foundry Riddle.



4 Tool Tool Post Turret

JEFFERSON MACHINE TOOL CO. 700 W. FOURTH ST., CINCINNATI, OHIO



OPERATION No. 3 ON A [redacted] CONSISTING OF CUTTING OFF THE [redacted] ON THE [redacted]

This is but one of many war production jobs now handled by **CAMPBELL** Machines—widely different jobs handled with top efficiency because **CAMPBELL** has a complete range, the *only* complete range, of Abrasive Cutting Machines—8 types and 19 models.

These machines are currently cutting steels of all types, annealed and unannealed; non-ferrous alloys, plastics, glass, ceramics—solid bar, tubular and flat stock.

If you are doing production cutting, you will find it worth while to ask the Campbell Engineering Department to develop procedures and costs for you. This puts you under no obligation. Send us complete data including materials, shapes, sizes, lengths before cutting, lengths of cut-off pieces and hourly production required.

Campbell — **ABRASIVE CUTTING MACHINES**

ALSO MANUFACTURERS OF A COMPLETE LINE OF NIBBLING MACHINES

ANDREW C. CAMPBELL DIVISION • BRIDGEPORT • CONNECTICUT

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

ON THE PRODUCTION FRONT

A STRIKING contrast between the demands of war production and normal peace-time automobile output is revealed in this picture taken at the main plant of the Hudson Motor Car Co.

The big Hudson Invader engine, used to drive invader barges for the Navy, is materially larger in nearly every dimension than the gasoline motors formerly produced to power passenger cars. Yet the company succeeded in converting nearly 600 machines on the former automotive production line to the manufacture of the mammoth engines for the Navy.

This changeover is exemplified by the big special Newton rotary mill shown in the picture. In the mill is an aluminum crankcase, weighing more than 100 pounds, used in the Invader engine. For the sake of comparison, the workman at the left is holding a sheet metal crankcase which served the same purpose in a 102-horsepower Hudson pleasure car motor.

The huge Newton rotary mill, with a rotating table and 8 milling cutters, can handle three of the big Invader crankcases at one time, roughing and finish milling the faces of the cases in one cycle.

Short-Cuts in Gun Production

More striking instances of automotive engineering ingenuity in speeding machine tool war work are reported by the Chevrolet Motor Division of General Motors in connection with the company's manufacture of component parts for the 90 mm anti-aircraft gun,





Fig. 1—Chevrolet's development of this air-driven grinding spindle, built into a turret lathe, with profiling attachment, saves eight hours in the manufacture of each powder chamber for the 90 mm anti-aircraft guns, and materially reduces scrappage.

details of which have just been released by the military authorities.

One full working day has been saved in the machining of each powder chamber for the 90 mm guns.



Fig. 2—Chevrolet engineers designed a die for use in this 50-ton hydraulic H.P.M. press, a hold-over from automobile-manufacturing days, and saved 11 hours in the removal of a fin on the breech ring of each 90 mm anti-aircraft gun.

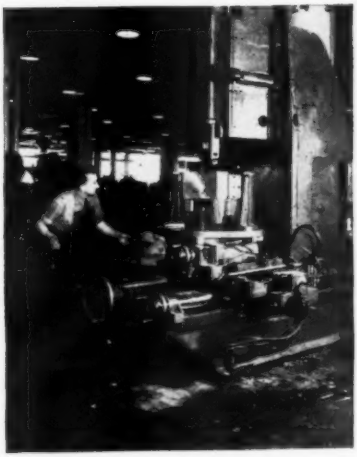
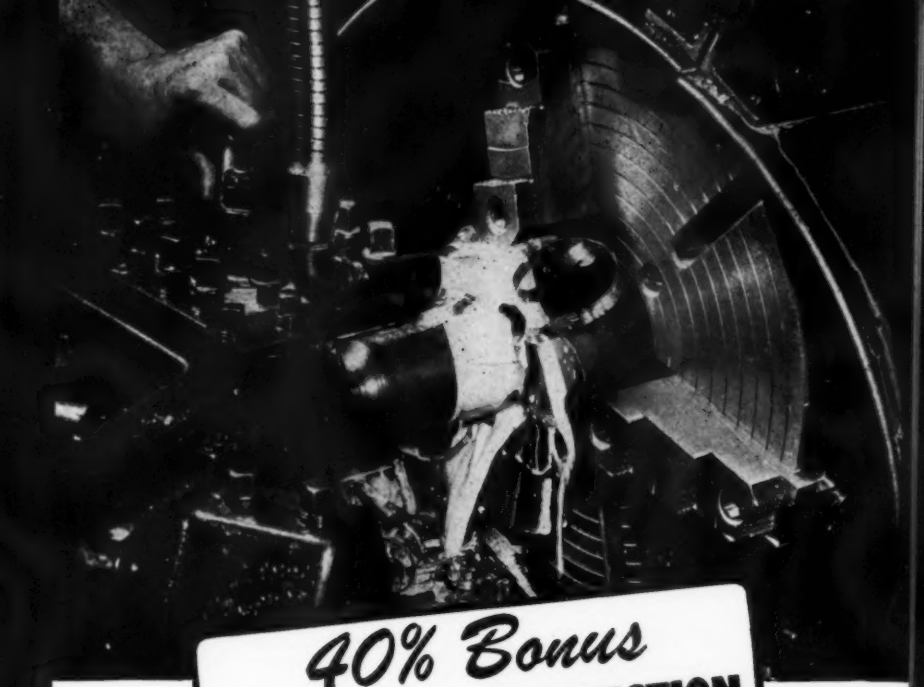


Fig. 3—This costly slotting machine was saved for other vital war production by the ingenious Chevrolet die setup in an old 50-ton press, which removes a fin from the breech ring much faster.

Formerly, 16 man-hours were required to machine this part, accomplished by forcing an expanding, two-blade wood-packed reamer into the tube,



40% Bonus
TOOL LIFE...PRODUCTION
SUNOCO EMULSIFYING CUTTING OIL

prolongs tool life...improves finish...increases production

The longer cutting tools last on the production lines ... the more vitally needed war material can be produced for the fighting line.

The value of the right cutting oil in prolonging tool life was amply proved by a large manufacturer of war material. When using a competitive cutting oil production was seriously slowed down because of short tool life ... poor finish ... and bad operating conditions. Then he switched to Sunoco Emulsifying Cutting Oil on his Warner & Swasey turret lathes. The high heat absorbing lubricating qualities of Sunoco stopped the trouble. Results ... tool life and production stepped up 40% ... finish on parts greatly improved.

From metal working plants large and small on America's production front reports such as these are constantly being received. Facts that prove why the majority of metal working plants flood their tools and work with Sunoco to get more pieces between tool grinds, reduce rejects, and make every man-hour and machine-hour result in peak production. Call in a Sun Doctor of Industry, let him prove the production value of switching to Sunoco in your own plant. Write

SUN OIL COMPANY, *Philadelphia*

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HI-SPEED STEEL HEAT-TREATING FURNACE

Standard equipment includes G. E. motor and extra large Johnson Blower, and Carbofrax hearth. Firebox 5½" high, 13" wide, 13½" long. Heavy insulating refractory lined. Use for quick, high, accurate temperatures for heat-treating hi-speed steels and clean heating of all types of steel. $248 F. O. B. Factory.

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JOHNSON GAS APPLIANCE CO.

584 E Ave. NW., Cedar Rapids, Iowa

compressing the wood in taper and often scoring or chipping the inside surfaces, necessitating reworking or scrapping.

Now, in less than half the time, an air-driven grinding spindle, built into a turret lathe with profiling attachment, forms a perfectly finished chamber. This is a machining adaptation suggested by the experience of Chevrolet engineers in automotive manufacture. For each chamber produced, eight hours are thus saved and scrappage is materially reduced.

A somewhat unorthodox procedure saves important time and labor on another step in the manufacture of the same gun.

To remove a fin on the breech ring of the powerful anti-aircraft gun, Chevrolet experts devised a die which, in a 50-ton hydraulic press formerly used in passenger car production, (Fig. 2), removes the fin with a time cost of but four hours, compared to the 15 hours otherwise required in the use of the vertical slotting machine shown in Fig. 3.

Cost of the slotting machine and equipment was nine times that of the die cost. In addition to saving 11 hours' productive labor and six hours of productive machine time, the improvised setup releases the slotting machine for other important war production work.

Tapping Machine Bulletin

An eight page 2-color bulletin covering its new line of high precision tapping machines has been released by Detroit Tap and Tool Co., 8432 Butler Street, Detroit.

BREMIL MFG. COMPANY

1700 Pitts. Ave., Erie, Pa.

ALL-ALLOY compound lever strap cutter. Cuts 1½ strap with one stroke.



The New MARTIN-OMBERG GLASS SURFACE PLATE



ADVANTAGES OF MARTIN-OMBERG GLASS SURFACE PLATES

1. Accuracy from .0002 to ± .0005
2. Will not rust, corrode, burr or warp
3. Better visibility
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5. Temperature affects accuracy less
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7. Warranted satisfactory

★

This glass surface plate was developed to fill a vital need for accuracy in the Aircraft industry.

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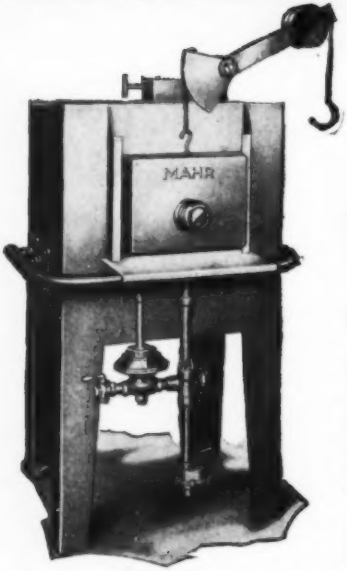
It is manufactured out of high grade glass and its surface accuracy is not affected perceptibly by temperature, corrosion or rust. Size 18"x24".

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Its price of $70.00 is much less than a steel or cast iron plate of comparable quality, and deliveries are prompt.

MARTIN-OMBERG ENGINEERING MANUFACTURING CO., INC.

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NO DECARBURIZING



MAHR Type "AC" Tool Furnace
Without blower, for connection to shop air line. Also self-contained unit with blower and motor attached. Underfired to 1800° F. Over and underfired to 2600° F.

MAHR Standard Pot Type Furnace
for salt and other molten baths. Gas or oil fired. Made in several sizes and types, either rectangular or cylindrical. Built for longer pot life. Can be supplied with or without hood.

when you heat treat with a TYPE "AC"

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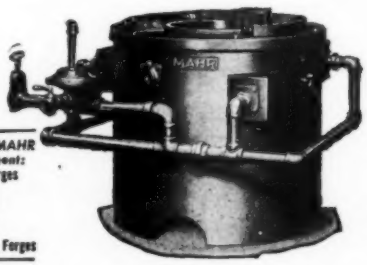
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Atmosphere, temperature and hardening are perfectly controlled in this MAHR Tool Furnace. It is especially adapted for using carbonaceous muffle blocks, so that stock being treated will come out bright, scale-free—and will not be decarburized. You are sure of accurate, pre-determined results.

Also furnished without muffle as a direct fired furnace, where effect of combustion gases is not detrimental to stock, or where refinements of a protective atmosphere are not necessary.

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BECAUSE they're made in 4 calibration ranges, dial gauge graduations on Mossberg Torque Tools are larger, more widely spaced. Assemblymen can read 'em easier . . . measure nut and bolt tensions on motors and other important assembly units faster, *more accurately!*

EXAMINE the improved, inside-the-handle dial mounting of Mossberg Torque Tools and you'll see another reason why they control tensions more accurately. This rigid mounting protects dials from bumps and jounces that might knock them out of adjustment.

WIDELY USED both for production and experimental laboratory work by the U. S. Navy – by plants turning out airplanes, tanks, battleship turbines and by submarine builders – Mossberg Torque Tools have *proved* 98% accurate under most severe conditions. Write today for complete information on sizes and prices!

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155 Lamb Street, Attleboro, Massachusetts



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How do you check the accuracy of your precision gage blocks? How do you maintain accuracy on your measuring equipment? How do you test the flatness of precision lapped parts? The Van Keuren Light Wave Measuring Equipment illustrated above measures millionths of an inch, and is a fundamental requirement in plants where precision is maintained. The equipment consists of three semi-quartz master flats, one steel flat and a monochromatic light. The monochromatic light shows clear and distinct light wave bands which have a known measuring value of 11.6 millionths per dark band. Straight bands indicate a flat surface and curved bands show a convex or a concave surface. Be sure to specify a Van Keuren Light Wave Measuring Equipment with completed instructions for your inspection work.

Van Keuren optical flats are the ultimate of precision. Single flats and optical parallels are available in 1¼", 2", 3", 4" and 6" diameters in both master and working grades. Special flats are made on order.

Optical flats are easy to use. Complete instructions on "How to Use Light Waves" are furnished with all Van Keuren flats.



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The light wave interference bands dip an amount equal to twice the distance between adjacent bands, showing a valley 2 bands (or 23 millionths) deep.

The Van Keuren Manual of Precision Measuring Tools gives complete specifications and prices on optical flats. Write for your copy.

THE Van Keuren COMPANY, 178 WALTHAM STREET
WATERTOWN MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks
Lapped Steel Flat Gages • Wire Type Flat Gages • Measuring Wires
Thread Measuring Wires • Gear Measuring Wires • Limit Snaphes

24th Year

Electronic Carbide Tool Brazing

COMMERCIAL availability of electronic induction equipment for routine brazing of carbide tools, using any suitable brazing medium including copper, is announced by Carboloy Co., Inc., 11139 E. 8-Mile Road, Detroit.

While based on standardized units, their use in each case is to be engineered to the needs of individual organizations—recommendations as to size of unit or units, basic coil designs, etc., being supplied by the Carboloy Engineering Department on basis of the individual user's needs.



Fig. 1—Induction brazing a cemented carbide tool with the new Carboloy-G. E. electronic equipment now commercially available.

Chief deterrent to use of induction equipment for the brazing of carbide tools heretofore has been the lack of availability of both specialized engineering knowledge and national service facilities on such equipment. The former is now provided through the Carboloy engineering service on induction brazing of tools. As to the latter, arrangements have been concluded whereby the national service organizations of both Carboloy and the General Electric Co., will cooperate in assisting manufacturers using the equipment.

The numerous advantages cited for induction brazing of carbide tools are:

1—Greater convenience—Brazing technique is much simpler than when either furnace or torch brazing is used.

2—Greater speed—Heating is confined to the actual area desired. Time required to braze a tool is cut from minutes to seconds.

3—Greater Simplicity—Unskilled labor can be used to braze carbide tools with induction equipment.

4—Accurate and Automatic Control.—The amount of heat and its distribution can be controlled in electronic induction brazing as by no other method. It prevents incomplete brazes or cracking of tips due to localized overheating.

5—Lower operating cost—100 average tools can be brazed for less than 10 cents total power cost. There are no furnaces to preheat.

6—Less brazing material needed—Less flux, etc., is required in induction brazing than in any other methods.

7—Cleaner Brazes—No scale formation—Neutral atmosphere not required even for copper brazing except when silicon manganese steel shanks are used.

8—Less maintenance—Fewer parts—No moving parts subject to wear or maintenance.

9—Greater safety—While considerable power is passed through the heating

coils, the nature of these high frequency currents is such that no danger is involved.

10—More Consistent Brazes—For a given size of tool, the same dial settings with the same coils will always produce exactly the same amount and distribution of heat, insuring consistency of brazing results.

Of prime importance is the simplicity with which carbide tools can be brazed with the new equipment. Complete instructions as to coil types and time cycles for the usual forms of carbide tools will be furnished users by the Carboloy engineering department.

With this information, the operator merely attaches the correct coil for the tools to be brazed, sets the control dials and the oscillator to the proper values as to current and time and pushes a button. The equipment takes care of the rest.

The equipment is based on a new line of General Electric high frequency (500,000 cycle) electron tube oscillators, available in two sizes (5 kw and 15 kw output ratings). Selection of the correct unit for any given installation is dependent on the sizes and quantities of tools to be brazed by individual users. The 15 kw unit is designed to accommodate larger sizes of tools as well as the brazing of production quantities of smaller tools by brazing two or more at a time. The smaller 5 kw unit is designed primarily for smaller sizes of tools.



Fig. 2—Last operation in electron tube induction brazing of carbide tools is to "seat" the tip firmly while the brazing material is still in a liquid condition.

The G. E. oscillators were selected because they are electronic, providing a high degree of sustained accuracy of heat control. They are particularly well suited to brazing carbide tools as rapid surface heating is obtained due to the higher frequencies used.

In addition to the oscillator, the only equipment actually required to braze tools by the electron tube induction method is a table carrying a tool holding fixture or fixtures, and the necessary water-cooled coil or coils to be connected electrically to the terminals of the oscillator.

The coils are simple to fabricate and may be formed by the user in a few minutes' time from ordinary copper tubing, when special brazing requirements arise. Where large numbers of tools are to be brazed and the unit has sufficient ca-

Now You Can Easily Drill HARDENED STEEL Without Annealing!

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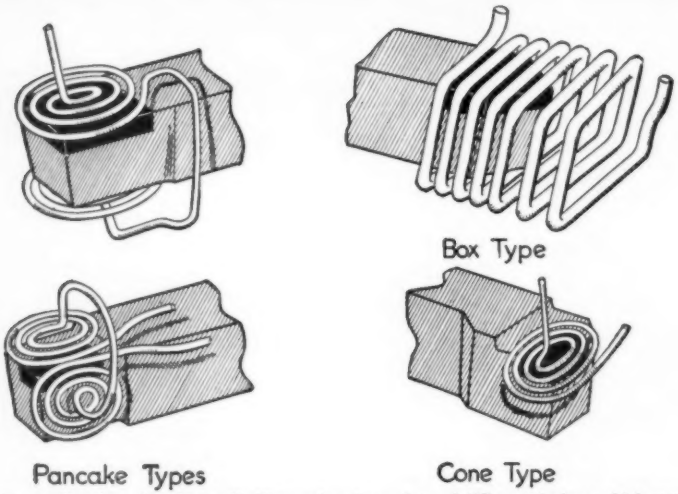


Fig. 3—Sketches of typical coils illustrating the variety of different designs which may be applied to the electron-tube induction brazing of carbide tools. Recommendations as to specific coil designs, time cycles, etc., are available from Carboloy.

NEDCO
Electric
SANDING—RUBBING MACHINES
SOLVE YOUR SURFACING PROBLEM

Rotary or Oscillating types.



Write for circular.

THE NEDCO COMPANY
WALTHAM MASS.

pacity, it is possible to use several coils in series, so that two or more tools can be brazed at a time. As shown in the accompanying sketches, the coils may take a variety of forms:—cylindrical, box shaped, conical, single and double "pancake", etc., depending on the type of the tool to be brazed and the distribution of heat desired.

Experience has shown that it is not necessary to "puddle" a tip while it is being heated. It is usually only necessary to "seat it" with a rod after the current is off and the tool has been removed from the coil.

During the heating cycle, the steel shank first heats up faster than the tip, due to its higher magnetic properties. Just before the correct brazing temperature is reached however, it will be found that the carbide tip has reached a somewhat higher temperature than the shank. This is a desirable feature since maximum brazing effectiveness requires a slightly higher temperature for carbide than the steel.

WOMEN WORKERS CAN HANDLE MASONITE* DIE STOCK



Women workers at Glenn L. Martin Company are shown using dies of Masonite Die Stock in the production of airplane parts by means of rubber hydro-press.

MORE and more women are helping to speed production in America's roaring airplane factories—and many of them are working with Masonite Die Stock.

Because this amazing semi-plastic material is only one-sixth the weight of steel, forming blocks, jigs, templates and assembly fixtures are easily handled by women.

With all its light weight, Masonite Die Stock has great compressive and flexural strength . . . stands up under heavy-duty production runs . . . can be machined and fabricated in metal-working or pattern shops with great speed . . . saves manufacturers precious time, as well as expense in tooling up and getting into production . . . conserves steel for other vital purposes.

Masonite Die Stock is available in thicknesses of ¼ to 4 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For further details, fill out and mail coupon below.

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ARMY (E) NAVY

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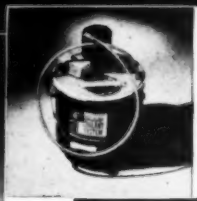
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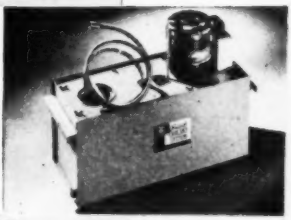
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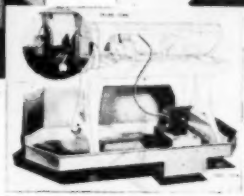


Model H-10A Centrifugal — capacities 10 to 1,000 gals. per hr.



Left: Standard Model — capacities up to 130 gals. per hour.





Above: Heavy Duty "A" Series Model — capacities up to 165 gals. per hour.

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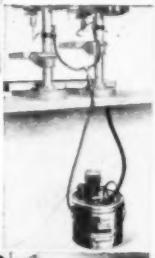
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Right: Standard model serving 2 drill presses.

Below: "A" series model on a bench lathe.





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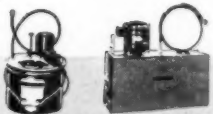


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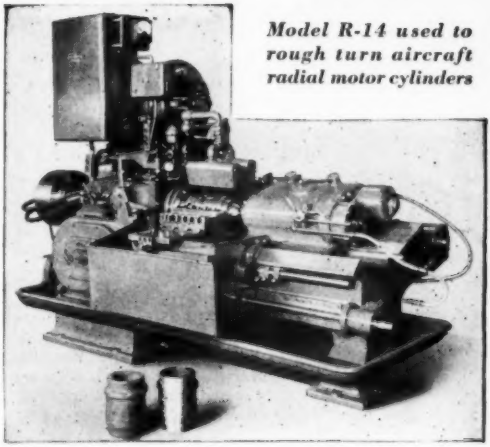
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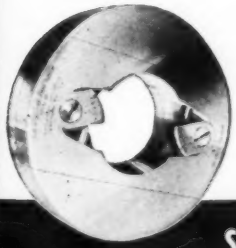


Model R-14 used to rough turn aircraft radial motor cylinders

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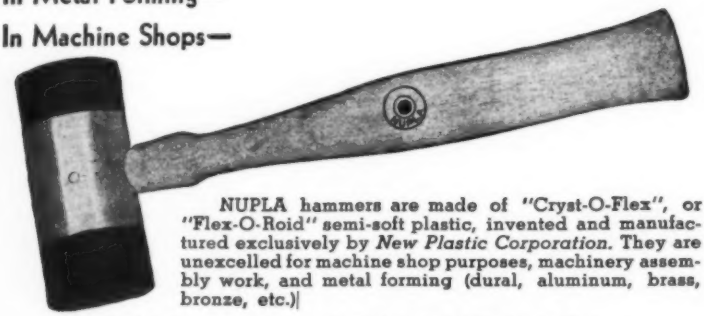
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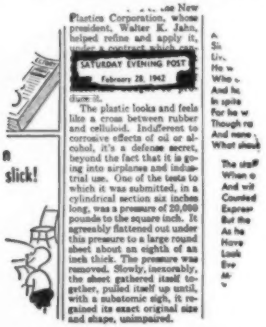
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1 "	8 oz.

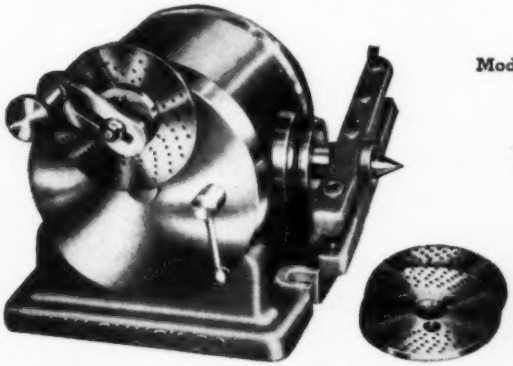
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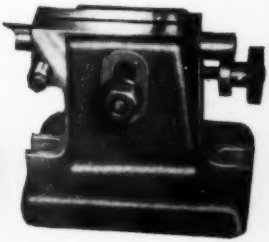
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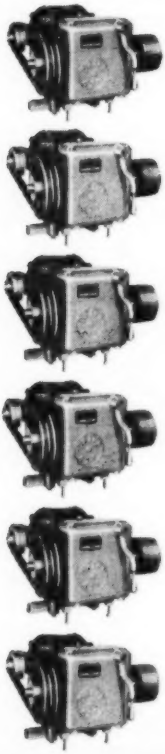


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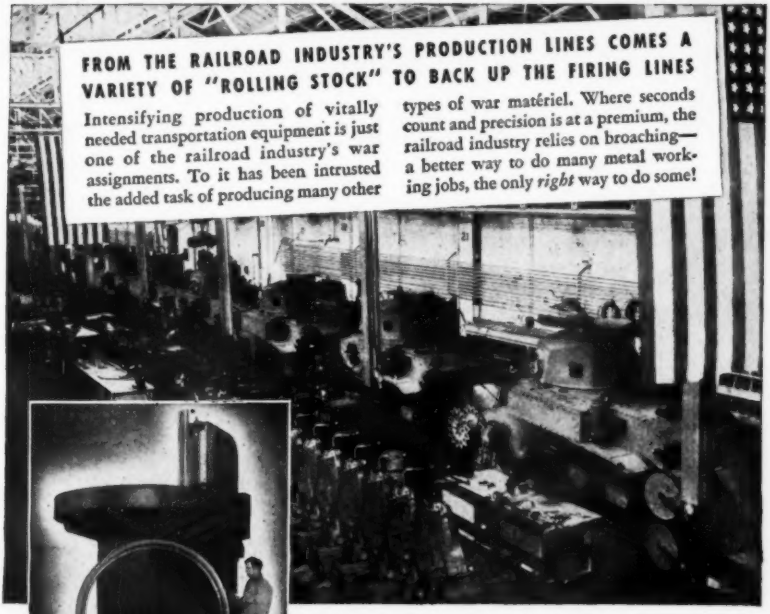
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SERVICING CARBIDE DIES FOR STEEL SHELL CASES

By EARL GLEN*

WITH the conversion from brass to steel for shell cases, ranging from 20 mm up to 90 and 105 mm, the use of cemented carbide drawing dies has now become standard accepted practice. Carbide dies were, of course, being extensively used for drawing brass cases due to their longer life and lower cost per piece produced. However, with the advent of steel shell cases, carbide dies became a necessity.

It is almost impossible to obtain reasonable steel case production without cemented carbide drawing dies. Conversely, therefore, the intensive and extensive development of carbide drawing dies has made possible the substitution of steel for brass, with attendant large scale conservation of critical materials, particularly copper. According to U. S. Army Ordnance, the saving on a single contract for 105 mm shell totals 12,600 tons of critical brass, as an example.

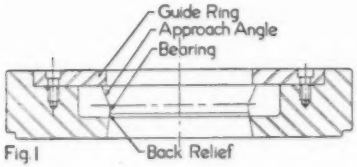


Fig. 1

The conversion from brass to steel did not present any unusual die manufacturing problems since the carbide dies used (see Fig. 1) do not differ a great deal fundamentally from carbide dies used in drawing steel tubing. They have been used for such purposes for several years with great success and Carboloy cemented carbide dies have become practically standard for this type of work.

Prime difference between most shell case drawing dies and steel tube draw dies is the provision of a guide ring plate on the former to guide the case into the die. When drawing steel tubing, the end of the tube is pointed so as to feed readily into the die without requiring a guide. In some instances of shell case drawing, moreover, rotary indexing tables are used, eliminating need for the guide ring.

As with any new application of a product, minor service difficulties are to be expected if the user is not acquainted with the characteristics of carbide dies and the proper scheduling and procedure for die maintenance. This is particularly important in view of the fact that a considerable number of organizations now switching to carbide dies for shell case drawing have had little or no experience with carbides in the past.

Service Requirements

It is absolutely essential that large-scale users of carbide dies for shell or case drawing, be in a position to service and re-cut such dies. Carbide dies will produce several times the number of cases, between servicing operations, that are possible with dies of other materials. It is however, necessary that they be serviced whenever a "wear-ring" appears in the die nib. In order to main-

*Engineer, Carboloy Co., Inc.

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tain continuous operation without an excessive stock of dies, which in turn involves the problem of materials conservation, the necessary simple equipment for both polishing and re-cutting of dies should be provided at the point of use. It has been found also, that when dies are not serviced by the user, there is a tendency to let them run longer on a job than they should for most satisfactory performance, both as to die life and continuous production quality.

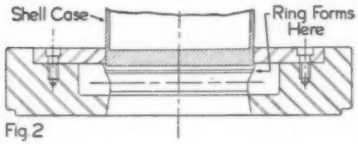


Fig. 2

One reason for this is an innate characteristic of all carbide materials. A shell case, when it enters the die, presents a relatively sharp edge at the O. D., where it first contacts the die approach angle (Fig. 1). After a period of time, a fine, very small "ring" is formed at this point of contact (Fig. 2). As soon as this ring forms, the die should be re-polished to remove it. If not, fine particles of carbide will gradually begin to break out resulting in a fairly rapid increase in die wear at this point until the surface at the ring becomes so rough as to cause pickup and even scoring of the bearing.

The length of time the average die will operate before this ring begins to form, varies with the individual installation and also depends to a great extent on the effectiveness with which the case and the die are lubricated. From this standpoint, it is highly important to see that the lubricant is carried through the die by the shell case. The most effective means of producing this result is to oxidize the shell case or provide it between draws with a thin rust coating to which the lubricant will adhere. As to the lubricants themselves, a great variety of different types are currently being used and no definite conclusions have been reached as to the most effective type for any given installation.

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Servicing Intervals

It is a good practice in drawing shell cases with carbide dies to establish a definite period at the end of which the dies should be removed for polishing. No exact time interval can be given, however, some companies being able to run three to four days before polishing, while others re-polish their dies every eight hours. Best practice is to watch the operation fairly carefully at the outset and determine the approximate period of time required before the fine ring begins to form.



Fig. 3—Removing ring from a carbide die, using a brass rod in a portable grinder and No. 3 diamond powder. It is then polished with a felt wheel and No. 5 diamond powder.

Polishing

The ring formed in a carbide die when drawing shell cases is much narrower than that experienced in drawing wire or tubing. This is due to the fact that there is more of a line contact between the case and the die than with any other form of steel drawing operations.

To remove the light rings, the major requirement as far as equipment is concerned, is the provision of a lathe large enough to handle the dies and a flexible shaft or similar type of hand

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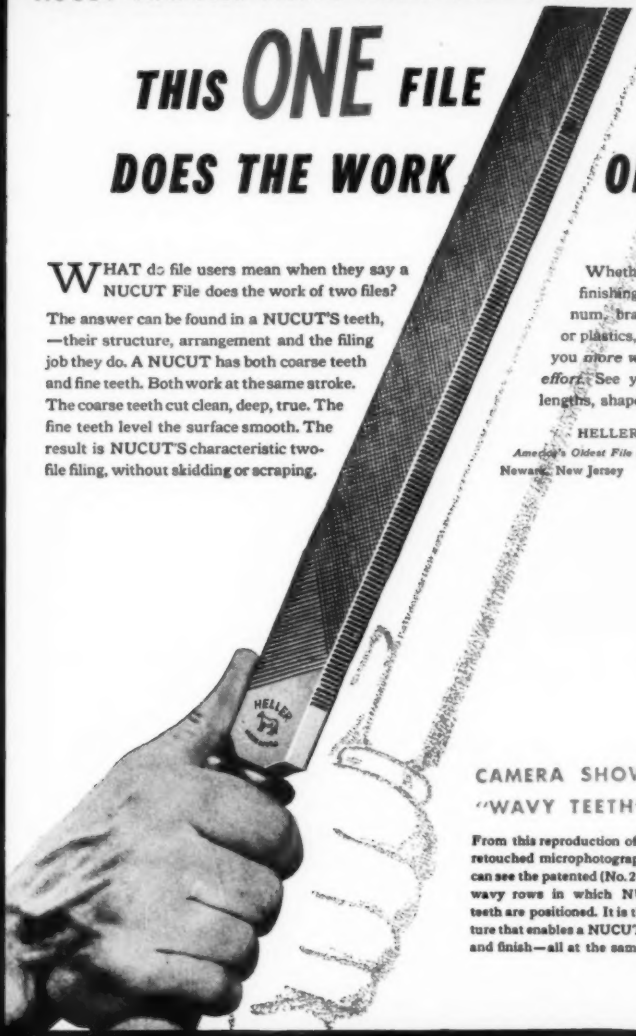
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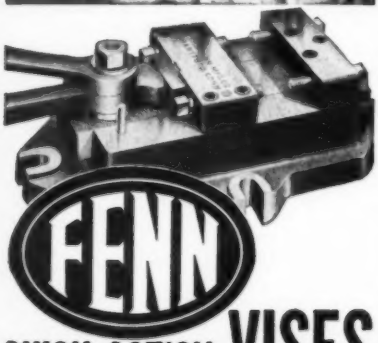
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grinder. To remove the rings, a brass rod is placed in the flexible shaft or hand grinder and with this the ring is removed and the surface smoothed out, using No. 3 diamond powder. The surface is then polished with a felt wheel in the flexible shaft or hand grinder, using No. 5 diamond powder (Fig. 3).

Removing "Pickup"

In servicing carbide dies, it is important that any pickup on the bearing surface of the die be carefully removed. This is particularly true on the final draw die. If pickup is removed with a stone, emery cloth, etc., it is easy to wear out the die more rapidly in polishing it than in normal service. The tolerance on the bearing diameter of the final draw die is only 0.002" and once this diameter has been exceeded, the die (unless it can be re-cut to a larger draw) will have to be scrapped. On preliminary and intermediate drawing operations, this is not quite so critical, but nevertheless here also it is quite possible to wear the die out faster in servicing than in actual use. The best practice is to cut any pickup off carefully with a sharp scraper and then polish the surface.

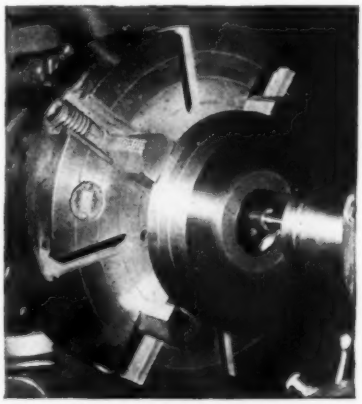


Fig. 4—An internal grinder is required for recutting carbide dies. After resizing with a diamond wheel, the die is lapped with diamond powder.

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Fig. 5—An assortment of carbide dies used in forming steel shell cases.

Die Standardization

As the result of cooperative study with the Ordnance Division and shell case producers, it has been possible to standardize carbide dies so that a single basic die size can be used for all drawing operations, from the first to the final draw on any given type of shell case. As a matter of fact, it is possible to start with a die for the final draw of a 37 mm shell case, gradually re-cut it as the die wears to the first draw on the 37 mm, and when worn out for this operation, re-cut it to handle successive draws on 40 mm shell cases. Similarly, a single die size can be used for 3" anti-aircraft and 105 mm shell cases. At the present time, standardization work is also going on to permit interchangeability of dies between the 75 and 57 mm shell cases. On the 20 mm and the 90 mm shell cases—the two extremes of the range in which steel shell cases are now being produced—one set of dies can also be recut for all draws, but the die cannot be re-cut beyond this to handle other sizes of shell cases.

Re-cutting

For re-cutting of dies, an internal grinder is required. With this and using a 100 grit diamond wheel, the bearing is first re-sized to within 0.001" of the desired dimension. The approach angle and the radii are then re-worked, using the same wheel.

The wheel is then removed, a steel lap inserted in its place and the die is lapped to size, using a diamond powder (Fig. 4).

Final polishing is with a buffing wheel, using a fine diamond powder, which should be mixed with olive oil. The buffing wheel should be used on a grinder or flexible shaft with the die mounted in the internal grinder.

In re-cutting, it is also important to re-establish the back relief angle to the correct specification.

Proper die maintenance, removing the rings in the approach angle as soon as they begin to form, will do much to lengthen the life of a die on any particular operation, and will reduce greatly, the amount of re-cutting necessary. The more the ring is allowed to wear, the greater will be the pickup and the faster the die will wear as a whole. This is due to the formation of high spots in the approach angle, etc., which cut through the coating on the shell case and cause scoring and pickup.

In addition, proper attention to die maintenance will materially reduce the number of dies required for any given production set-up, an important point in connection with materials conservation, as well as in reducing the necessary die-inventory.

* * * * *

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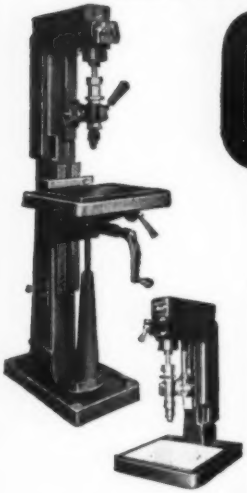
BY SPECIALIZING in the manufacture of thread plug and ring gages, to the exclusion of all other types, Cadillac Gage Company has built up an exceptionally large stock of standard thread plug gages, especially in the machine screw sizes. Orders and re-orders from the nation's leading armament manufacturers testify to the quality and accuracy of our products. Wire us your orders!

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The Avey Catalog details the line of Avey Drilling Machines and Drilling Machine Accessories.

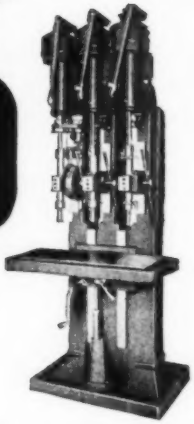
Avey Engineers will come to your aid in solving new and different drilling problems.

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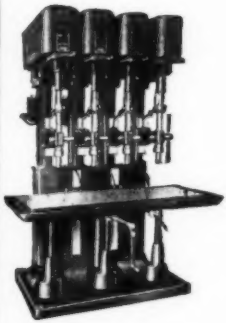
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MA 6—Six speeds. No. 2 and No. 3 sizes. Built-in motors.

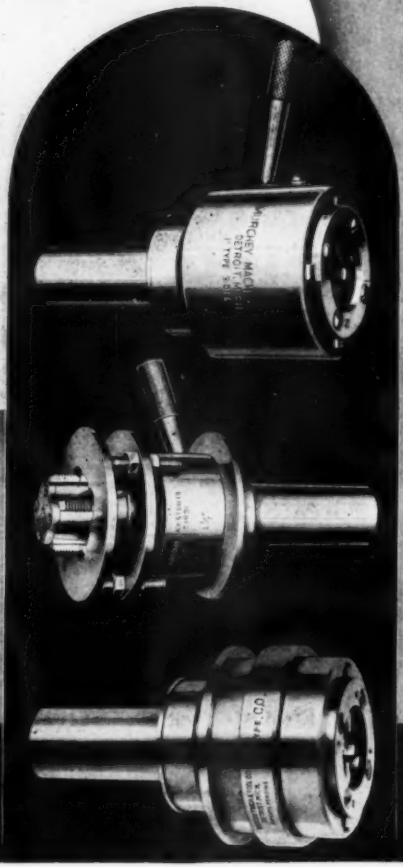


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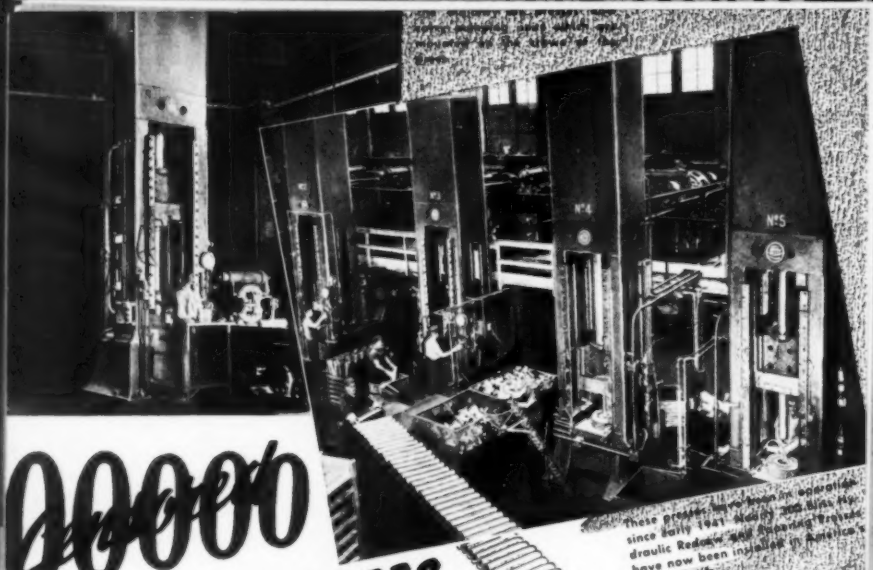
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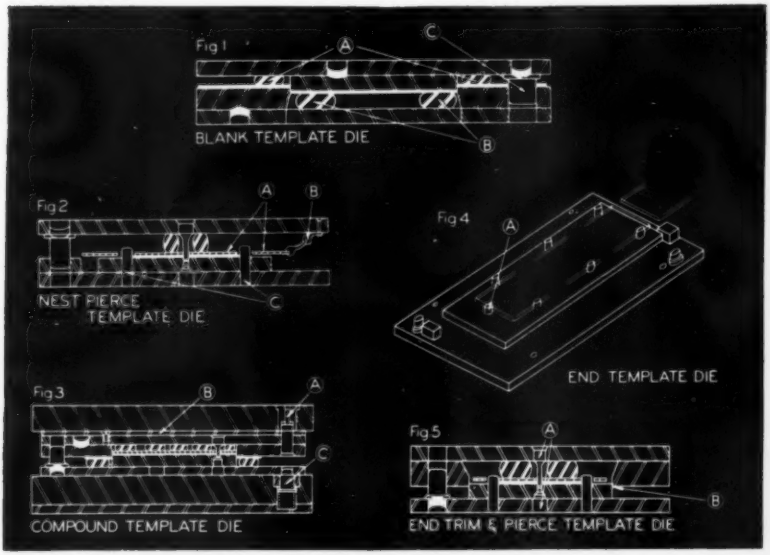
SPEEDIER DIE PRODUCTION

MEETING the demand for faster production of the multitude of blank and pierce dies needed by the aircraft and other industries, a 300% faster method of manufacturing such dies is announced by Algoma Products, 3080 E. Outer Drive, Detroit. The process, incidentally, is said to reduce the cost approximately 65%.

In the Algoma method, dies are produced from templates of the parts themselves. This method of fabrication eliminates need of special die design. The construction employed also simplifies alterations due to engineering changes.

Instead of the usual complex, time-consuming and costly milling operations, the dies are contour-sawed from chrome molybdenum steel, filed, sheared to size, hardened and welded to inexpensive back-up plates. One-third of the critical alloy steel required in conventional dies is thus conserved. Individually replaceable pierce punches of hard drawn tool steel are pressed into the blank die and matching holes drilled in the blank punch for piercing holes in the part.

Algoma Template Dies are self-stripping and self-ejecting. Small rubber blocks, cemented to the back-up plates near the edges of the punches and in the blanking dies, are compressed on the down stroke, and in returning to shape on the up stroke, strip the punches and eject the part from the die. Where a large number of pierce punches are required, a thin aluminum

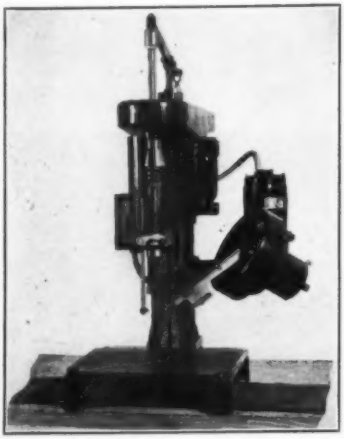


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A Production Machine that Drives Small Screws at One Second Each.

MACHINE HANDLES

From No. 2 x 1/8 Screws Up to No. 6 x 3/4.



SEND SAMPLES FOR PRODUCTION ESTIMATE

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alloy plate is cemented over the rubber blocks to equalize the stripping pressure.

All punches and dies are heat treated to withstand continuous production service. Blank punches are cyanide hardened, blank dies flame hardened at the cutting edges, and pierce punches hardened and drawn to 40-42 Rockwell C.

Punch and die are kept in alignment by two guide pins of different diameters in one portion of the die and matching hole in the mating part. The different diameters prevent incorrect assembly of dies in press.

Complete die assembly is designed for installation in standard die sets of a popular make, or on press bolster plates with the proper shut height. Two mounting holes in each back-up are held to fixed dimensions for each range of die size so that all dies are interchangeable on standard die shoes.

Available for either single, compound or progressive operations, Algoma Template Dies are adaptable to blanking and/or piercing from sheet stock or stock sheared to the width of part. In the latter operation, individually removable nest pins are inserted in face of die to guide the work.

The accompanying page of drawings show typical dies being produced by the Algoma process. Note:—Blocks of rubber for stripping (Fig. 1-A), for ejection from the die (Fig. 1-B); Alignment guide pins of different diameters to prevent incorrect assembly (Fig. 1-C); thin aluminum plate to equalize stripping pressure (Fig. 2-A); chain supports (Fig. 2-B); inserted work-locating nest pins (Fig. 2-C). Die to shoe mounting cap screws (Fig. 3-A); Spring supported dowels to blow off slugs (Fig. 3-C); Separate back-up plate for punches in the larger size dies (Fig. 3-B); Stop pins for one-end cut-off (Fig. 4-A); end trim and pierce die obtained by merely inserting pierce punches (Fig. 5-A); end trim die for either sheet stock or stock sheared to the proper width (Fig. 5-B).



TWO million atoms could lie in a line across the dot of an i—yet each alone is a complete solar system, with electrons whirling around a central nucleus like planets around the sun. And that nucleus occupies no more space in its lonely atomic universe than a fly in a cathedral.

This is the physicist's picture of the atom, source of all energy. And today, with giant cyclotrons, he is smashing the atom—hurling these tiny planetary systems at each other with the speed of shooting stars, and with miraculous results: Sodium transformed into magnesium, aluminum into phosphorus—and the atom itself into power beyond the wildest dreams of Watt or Diesel or Edison. . . . In an ordinary glass of water is the potential power of a billion kilowatt hours!

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This story of atomic power is only an extreme illustration of the problems that industry faces as a result of *change*.

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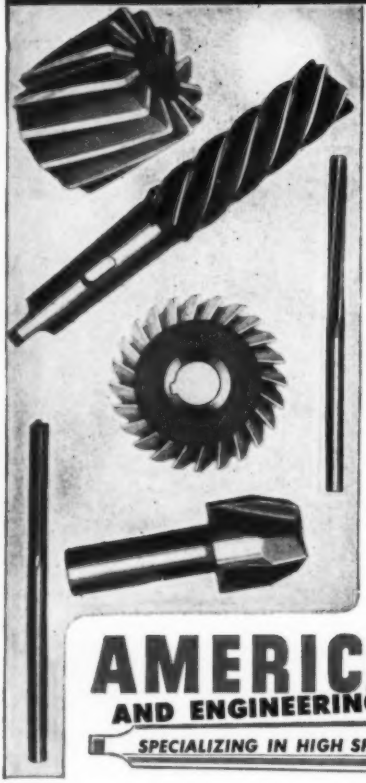
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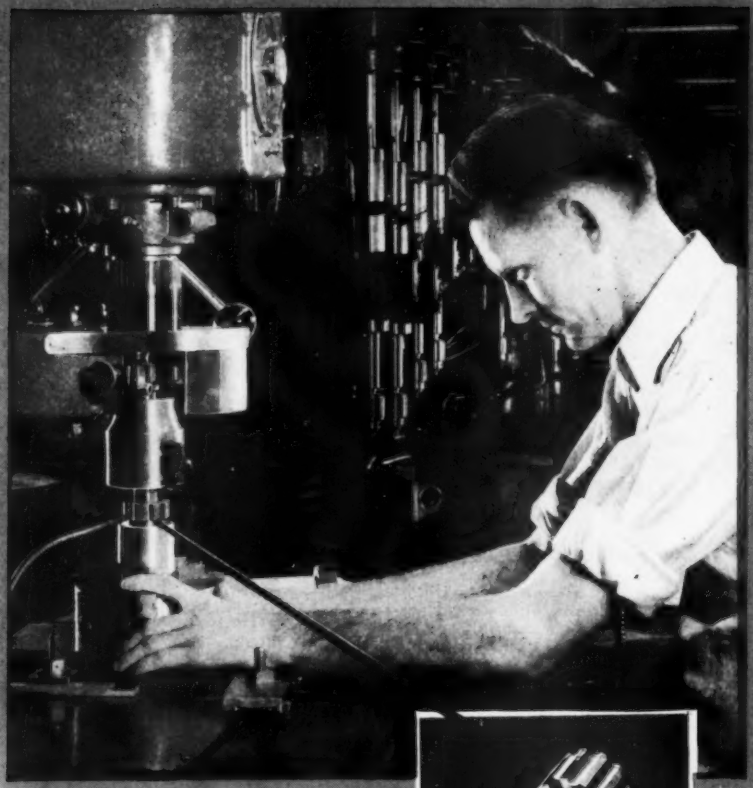
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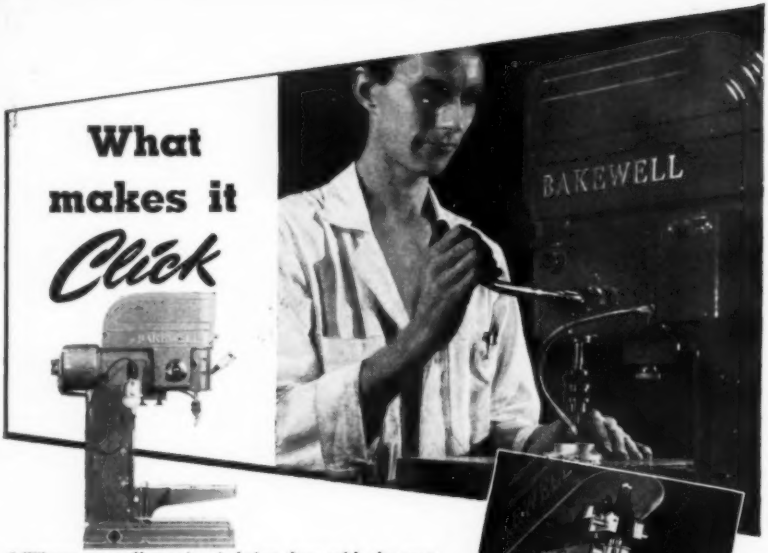
Speed up your tapping and help save vital material by using these precision ground VARD two-piece taps. Made in sizes from 2½" to 4" in all standard thread forms (except Whitworth) and in right or left hand thread.

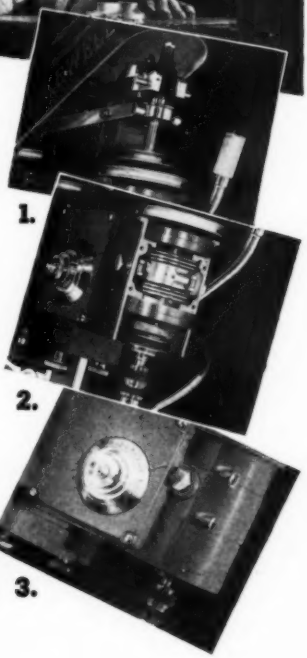
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What makes it *Click*





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2.

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● Wherever small tapping is being done with the new Bakewell No. 0 Tapping Machine performance records are made that were never before possible. Precision cut threads in the smallest sizes are guaranteed by the patented Bakewell lead screw feed and electrically operated guide finger control.

A sensitive solenoid actuated clutch practically eliminates tap breakage by releasing the instant the tap encounters difficulties in operation.

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These are but three big reasons why this little Bakewell Tapping Machine will win the precision tapping production battle—why it will put wings on your war production if you're tapping to Class 3, 4 or 5 fits in 0-80 to 10-24 sizes.

1. *Hobbed lead screw cuts mating threads on "electric" guide fingers.*
2. *Adjustable clutch releases when tap becomes dull or hits chips.*
3. *Depth and height limits are regulated to within 1/10 of a cycle.*

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Remedies For Tax Headaches

By ARTHUR ROBERTS

YOUR income tax is now a major expense and every lawful means should be taken to keep it at a minimum. These remedies are prescribed for sore spots frequently encountered in handling tax problems for those using tools and machinery:

1—Taxpayers often omit certain expenses and liabilities that should be entered in the year covered by the return, and then try to deduct them the next year. A taxpayer may deduct all authorized expenses and losses, but if he does not make these deductions within the taxable year, he cannot deduct them from the income of the next or succeeding years. Do not overlap returns. Make deductions in the year the liabilities occur, or you pay more tax. Losses incurred in any business transaction are ordinarily deductible, provided they are closed transactions during the taxable year. Full consideration must be given to salvage value, to insurance or other compensation received. A loss occasioned by damage to an automobile kept for pleasure, where such damage results from faulty driving of the taxpayer or other person operating the automobile, but not due to the wilful act or negligence of the taxpayer, is a deductible loss in the computation of net income. If damage to a taxpayer's automobile results from the faulty driving of the operator of an automobile with which the automobile of the taxpayer collides, the loss by such damage is deductible.

2—Pro-rate all accrued items to the end of the year and take deduction. Accrued items are expenses due in the taxable year but not paid when the taxable year ends. Many taxpayers in this field omit accrued items, which are ordinarily not deductible the next year so they lose out on the tax benefit. For example, say you pay $3,600 yearly mortgage interest on your business property, due September and March, $300 monthly. At the end of the year, interest from September to December, $900 for 3 months, is an accrued expense, payable the following March, but it should be deducted from that year's income and not carried over to the next year even though paid then.

3—Do not capitalize maintenance ex-



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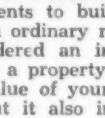
Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.
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pense. Be carefnl to differentiate between ordinary repairs and improvements to buildings and machinery. If an ordinary repair costing $500 is considered an improvement and charged to a property account, it increases the value of your asset holdings on paper but it also increases the tax. Repairs that keep a building and machinery in ordinarily efficient operating condition, are an expense. There are numerous borderline cases of this type, which may be considered an increase in capital or an expense. Be conservative in capitalizing such items, which logical argument will support as expenses.

4—Do not wait until the last day to file your return. Out of 101 cases examined during the past year, 65 taxpayers or 65 per cent prepared their returns within a few days before the deadline date. In almost every case, it was discovered that economies could have been effected if more consideration had been given to problems requiring some preparation.

5—Figure inventory conservatively. Records disclose many case histories where taxpayers have been too optimistic about the value of their inventories and figured them too high. This practice produces a higher net profit on paper and compels the taxpayer to pay tax on the "water". To play safe on future returns, figure your inventory at cost or market, whichever is lower. Do not depend on your book figures. They are guides to the calculation of inventory but never sufficiently accurate for income tax purposes. Take a physical inventory at the end of the year and adjust the books to agree with the actual count.

6—Deduct non-business expenses. Previously, income from non-business activities was taxable but expenses resulting from such activities were not deductible from gross income. From now on, this inequality stands corrected. Any charge incurred in connection with the earning of taxable income is now deductible. This includes depreciation on properties used in business or non-business enterprises. You can-



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No. 1-S (Right)—Approximately 7 gal. capacity; 16"x10"x 11" tank. ¼ H.P. motor. For Milling and Screw Machines, lathes, etc. $98.50 each for 110 volt, 1 phase model, and 220 volt, 3 phase model. 550 volt, 3 phase model—$108.50.

No. 206 (Left)—Approximately 15 gal. capacity. Tank 20"x16"x16". ¼ H.P. motor. For grinding machines, multiple spindle drills. $95.00 for the 110 volt, 1 phase model, and 220 volt, 3 phase model. $112.00 for the 550 volt, 3 phase model.

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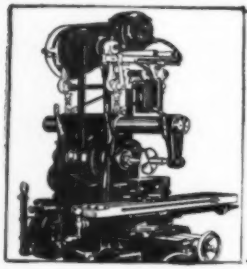
REYNOLDS MACHINERY CO., 211 EDDY ST., PROVIDENCE, R. I.

not deduct expenses connected with a hobby or non-business enterprise not bringing in taxable income.

7—Make adequate deduction for bad debts. It is calamitous enough to lose money on bad accounts but when you also lose on the tax deduction, it is a double dose. Just because a debtor hasn't paid is no reason to assume that the debt can be taken as a deduction on your tax return. Before a taxpayer may charge off and deduct a debt, he must be able to demonstrate, with a reasonable degree of certainty, that it is uncollectible. If you file on a cash basis, you cannot deduct for bad debts at all because, not having received the cash for the credit sale, you did not include it in income and pay a tax on it. You get a deduction for bad debts because the Treasury Department wishes to return the tax you paid when you filed the return including the debt. This you do only when you file on an accrual basis, inasmuch as you then list credit as well as cash sales as income.

Ordinary business debts are deductible wholly or in part. Non-business debts must be totally worthless before deduction is allowed. Bad debts arising from unpaid salaries, rents and similar items of taxable income, may be deducted if such items have been previously reported as income, otherwise not. I find that the main reason taxpayers in this field lose out on bad debt deductions is that they carry them on the books long after they are found worthless. A debt must be charged off in the year ascertained worthless, otherwise, it may not be allowed. You may deduct the loss on a debt due from a deceased person whose estate is insolvent. Unless you can prove that personal loans and loans to relatives were made on the "up-and-up" with the reasonable expectation of repayment and are definitely uncollectible, you will not get far with this bad debt deduction.

You cannot charge off bad debts if you use a reserve for bad debts in your accounting system because, by this method, you estimate the deduction on a percentage-of-sales basis, charging the actual bad debt losses to the reserve. Under the direct charge-off method, you take deduction for the ac-



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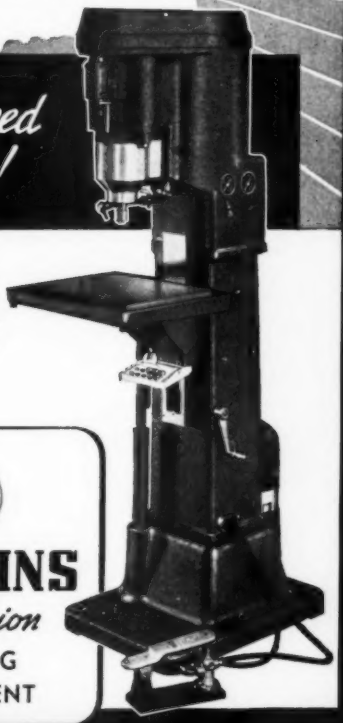
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Second operation tapping on Haskins Tappers brings you faster, steadier production.

Second operation tapping on Haskins Tappers brings you more accurate work—completely free of tolerance problems.

Second operation tapping brings you definitely lower costs per man and machine hour.

May we place complete facts before you? Write for new literature which shows interesting tapping operations on critical war work. Contains many money saving, money making ideas. R. G. Haskins Company, 624 S. California Ave., Chicago.

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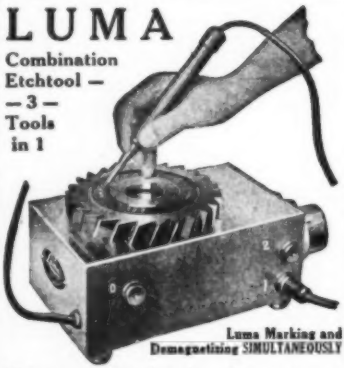
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Dept. H—Main P. O. Box 132, Toledo, Ohio

tual debts in the year they are ascertained worthless. Recoveries of bad debts previously charged against a reserve account are not taxable income. Bad debt recoveries on the direct charge-off method are taxable income.

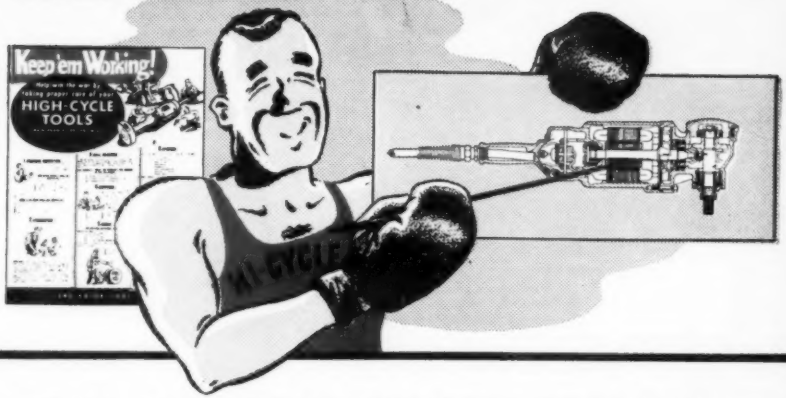
8—Usually there is only one right way to view the tax procedure. But in certain borderline cases, recording depends on the interpretation of conditions peculiar to a business. Hence, the interpretation will vary according to the conditions found in different companies. For example:—An item may be considered an expense or a capital increase, a business asset or a capital asset, etc. When a transaction may be interpreted in two different ways with equal propriety, use the interpretation in your favor. This is not tax evasion. It is tax avoidance. There's a big difference. The U. S. Supreme Court has ruled that a taxpayer may use any legal means available to keep his tax at a minimum.

When income tax rates were low, it caused little financial difficulty to pass up deductions that could have been taken. Today, with tax rates the highest in history, every dollar deducted means a proportionately larger saving. So it is advisable to take all you can get legitimately. There is no stigma attached to the taxpayer who follows the tax laws and tries to keep his expense at minimum.

A final word:—Remember that accounts of no account do much to stymie tax economy in this field. With the tax rate so high, the taxpayer can no longer afford to hazard inaccurate recordings. If the records are vague, it may be necessary to figure the tax arbitrarily and if the government auditors check the books, they may figure the tax higher than it should be. More than one taxpayer in this field has kept records below par in days gone by. Play safe with adequate, accurate records today.

They give their lives—
You merely lend your money—
Buy an extra War Savings Bond whenever you can.

MAINTENANCE POINTERS FROM HI-CYCLE O'TOOL



JOIN THE MAINTENANCE "REGULARS"

to keep your tools in fighting trim

High-Cyle Tool Maintenance Explained in Booklet

How Often Should Tools Be Inspected?
What To Do When Tools Are Inspected.
Correct Amounts of Grease To Use.
Ball Bearings—Replacement and Care.
Switches—How To Prolong Their Life.
Care and Repair of Cable.
Causes of Stator Troubles and Overheating of Tools.
How To Order Spare Parts.
Selection of Frequency Changers.
"Shorts", "Grounds", Single-Phasing.
Fusing For Peak Output.
Safety Rules.

Ask for "Keep 'em Working" Manual

THE simplicity of HIGH-CYCLE tools makes them easier to service than other types of electric tools. They have no brushes, commutators or wound rotors. But, like any portable tools, they give best results with good care.

Preventive maintenance is the kind of trouble-shooting that helps most to win the war. Don't wait for tools to break down. Keep 'em in fighting trim. Join the "regulars" of tool maintenance:

Inspect them regularly.
Clean them out regularly.
Lubricate them regularly.
Check electrical parts regularly.
Replace worn parts.

. . . to keep production up and repairs down.

Practical pointers on HIGH-CYCLE tools, of value to maintenance and electrical engineers, are given in the booklet "Keep 'em Working". Its table of contents is shown at the left.

This information in condensed form also is given on a handy wall chart for use by your tool and maintenance departments. A similar Rotor Tool Conservation Plan is available for AIR tools. State your wishes. They're free to plants that will put them to work.

AIR HIGH CYCLE

THE ROTOR TOOL CO.

CLEVELAND OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

CIRCLE (R)

METAL CUTTING SAWS

MADE BY

PERFECTIONISTS



CIRCULAR

TOOL COMPANY, Inc.

PROVIDENCE, R. I.

CHICAGO · PHILADELPHIA · NEW YORK

DAYTON · CLEVELAND · SYRACUSE

INDIANAPOLIS · DETROIT · ST. LOUIS

Heat treating in furnaces automatically controlled by potentiometers, the most accurate instruments made for the purpose. Thus uniform toughness and a durable cutting edge are assured.

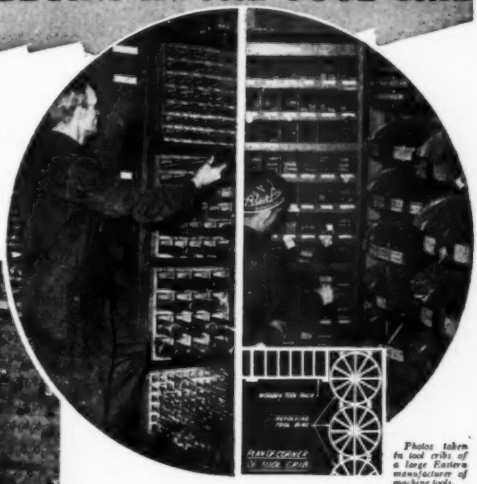
ALSO . . .
COMBINATION DRILLS
AND COUNTERSINKS
AND REAMERS



Tool Conservation BEGINS IN THE TOOL CRIB

Broaches (in circle, left) that formerly took much more space when spread lengthwise on flat shelves, now fit easily into these bins. Clear visibility and convenience to the delivery window mean less waiting time for these tools.

Revolving bins (in circle, right) make the most of every square foot of space, give ready access to their contents. Sketch indicates how former "dead corner" was saved, and space made for wooden tool racks.



Photos taken in tool cribs of a large Eastern manufacturer of machine tools.

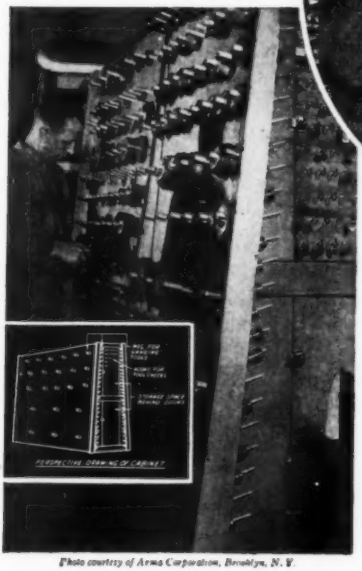


Photo courtesy of Arma Corporation, Brooklyn, N. Y.

Dead Space usually found in center of crib utilized by double deck "slanting-side" cabinet. Tools hang on sides, bulky items are stored inside. Doors are used for "in and out" tool checks.

AND Saves Space TOO!

Perhaps you've been thinking, "Yes, I'd like to plan my tool crib to take better care of my tools — but the plant can't give me more floor space."

Then you'll be interested in seeing how some plants improved their tool storage, and saved space too!

As these photographs show, space may be saved by:

1. **Rearrangement of storage facilities.**
2. **Alteration or substitution of equipment.**
3. **Utilizing waste floor or wall space.**

Yes, your tool crib can pay big rewards for a little careful thought.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS
DETROIT PLANT: 5850 Second Blvd.
WAREHOUSES in New York, Chicago and Los Angeles
In Canada:
GREENFIELD TAP AND DIE CORP. OF CANADA, LTD., GALT, ONT.

GTD GREENFIELD
TAPS · · · DIES · · · GAGES · · · TWIST DRILLS · · · SCREW PLATES

ARMY E NAVY



CENTER SCOPE, the optical locating tool, makes accuracy a habit regardless of who uses it . . . It locates edges on layouts to "within a tenth" — does it fast — and the operator can see that he is right!

The Center Scope can be used on any machine tool and provides an easy method to compensate for spindle or adaptor run-out. It is a precision instrument not affected by wear, temperature or mechanical pressure. In addition to its many advantages, it is attractively priced. You can get your Variable Center Scope for only $97 f.o.b. Los Angeles, Calif.; Edge Block is $23 additional. Other models slightly higher.

For further details write for Bulletin No. 201-A.

Buy Victory with at least 10% in War Bonds!

Rotary Head Milling Machine
Autometric Jig Borers
Center Scope

Kearney & Trecker
Products
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
Milwaukee Midgetmill
Milwaukee Speedmill

"Let's Talk Shop!"

"CAREFUL, PLEASE — OF THOSE VERNIER TOOLS!"

THE shortage of Vernier Tools is acute—keep every Vernier in useful service to help make new ones available for urgent needs. As war production demands have increased, the task of supplying America's needs for Vernier Tools grows increasingly difficult. With production schedules tremendously stepped up for tools of all types, the limited number of manufacturers are still far, far behind on deliveries. There just aren't enough new Vernier Tools being produced to fill the orders—covering not only the many needs for new uses of Verniers but also the ever-present need for replacement of tools that have been damaged.

Under the pressure of our "all-out" war production, replacement of damaged tools reaches an alarming condition, particularly with so many new and inexperienced workers taking part in the war production program. Hence it becomes doubly important to keep every possible Vernier Tool in useful service. If inexperienced workers will observe these suggestions, it may help to relieve the present situation to a very worthwhile degree, at a time when it may take months to obtain tools for replacement.

HANDLE WITH CARE should be the watchword for everyone using Vernier Tools, particularly large tools, to avoid any chance of springing the relatively delicate parts.

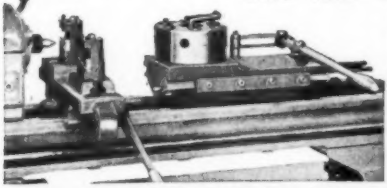
WHEN NOT IN USE, keep Vernier Tools covered for protection, so they will not be damaged should other tools be dropped on them. Even a relatively slight blow may cause unsuspected damage and misalignment that will impair the tool's accuracy. Simply placing the tool in a drawer may not give the needed protection. A suitable box is preferable and it takes only a moment or two to provide this necessary protection from damage.

KEEP THEM CLEAN is another good motto, dirt carried by the slide, can damage graduations and interfere with the nice operation of the tool. Always wipe the bar so that all dirt or grit will be removed before moving the sliding member. Take particular care, also, when replacing the sliding member on the bar that the original position of the gibs is not reversed.

HEAT AFFECTS ACCURACY and must be kept in mind at all times when using Vernier Tools. It is surprising how this point is overlooked so frequently.

HEAVY DUTY Self-Indexing BED TURRETS

SAVE TIME • SPEED PRODUCTION • CUT COSTS



Complete unit with cutoff cross slide and tool posts designed for Logan, South Bend, Atlas and similar types of bench lathes. This unit is equipped with a heavy 6 inch turret head and built to bore out to 1 inch, permitting the use of solid sockets with Morse tapered hole, accommodating No. 1 and No. 2 taper, which is not possible with the ordinary 5 inch head.

HANDLES SCREW MACHINE WORK

Ask Your Jobber or Write for Circular

LYNN MANUFACTURING CO., 219 Elroy St., Minneapolis, Minn.

DIAMOND TOOLS



SMITITE STA-KOOL

The STA-KOOL Single-Point Tool is equipped with internal coolant ducts and external cooling fins to quickly dissipate the heat generated in the nib, thus prolonging tool life.

SMITITE Diamond Tools employ a sintered metal setting which firmly holds the stones till they are completely consumed, without resetting.

Catalog on request.

J. K. SMIT & SONS

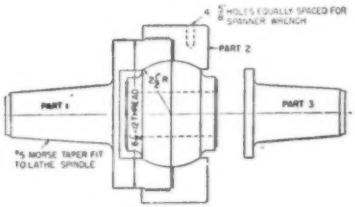
157 Chambers St., New York, N. Y. 6400 Tireman Ave., Detroit, Mich.

The result is that the tool may be innocently blamed as being "inaccurate" when it is purely the user's fault. Hold a Vernier in the hands just as little as possible, particularly just before taking a measurement. This prevents heat transfer from the hands causing expansion that may affect the vernier reading. Also see that the tools are not placed near heat sources, such as in the sunshine or near steam pipes which would raise the temperature of the tool far above the room temperature—it's a very important point and frequently overlooked.

Remember that every Vernier kept in useful service helps our country's war production—that the demand for verniers is great and that the supply of new tools is extremely limited.

BEARING HOLDING FIXTURE

A holding fixture developed at General Electric's Schenectady Works permits speedier and more accurate boring, turning, and facing of split-type ball seat bearings for a high-speed machine. The fixture has three parts. Part one has a tapered shank to fit the lathe spindle and a ball seat fit to receive the bearing. Its outside diameter is threaded for a holding nut, part two. Part three is a center which fits the tailstock.



FIXTURE TO HOLD BEARINGS FOR MACHINING

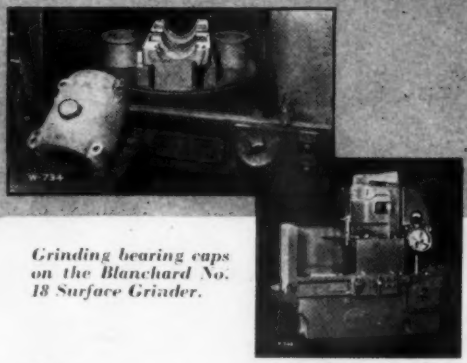
In a routine setup, the tapered shank of the fixture is slid into the lathe head, and the bearing is placed in the ball seat fit. The holding nut is then put on and tightened by hand. The flanged center is placed in the tailstock and tightened against face of the bearing so it is absolutely square with the machine. The holding nut is then tightened with a wrench and with the tailstock pushed out of the way, the part is in position for boring.

"PUT IT ON THE BLANCHARD"

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- Production
- ★ Adaptability
- ★ Fixture Saving
- Operation Saving
- Material Saving
- Fine Finish
- ★ Flatness
- Close Limits

★ . . . . . *Especially valuable on jobs like the one illustrated.*



Grinding bearing caps on the Blanchard No. 18 Surface Grinder.

THE surfaces on these bearing caps were formerly milled in 34 to 40 minutes each — now they are Blanchard ground at the rate of 7 pieces per hour. The Blanchard No. 18 not only increases production, but decreases setting-up time and eliminates expensive fixtures.

The caps are laid on two parallel bars on the chuck. Smaller steel blocks are laid on top of them and against the caps. Two hollow steel rings against these blocks serve to hold the work sideways. A steel block is placed at each end and the magnetism is turned on.

¼" of stock is removed from the cast iron bearing caps to limits of +.010".

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE, MASS.

BLANCHARD

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.





Installing Machinery in your Plant?

SYNTRON

ELECTRIC HAMMERS

Drill Anchor Bolt Holes in Concrete

Quickly—Easily—and Economically with their 3600 Powerful Blows per Minute

Write for your copy of our new catalog No. 430.

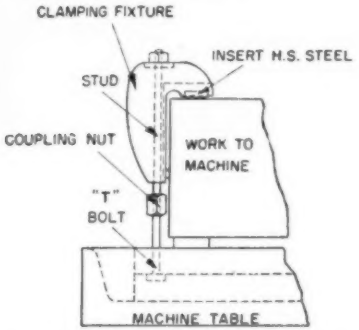
SYNTRON CO.

300 No. Lexington Ave., Homer City, Pa.

Previously these bearings were held in position by a four-jawed lathe chuck. This required the indicating of the ball seat and face, and adjustments were made by tightening jaws of the chuck, which might spring the bearing.

POSITIVE CLAMP FREES TABLE SPACE

The old system of clamping work to machine tables by means of "U" clamps has been displaced in some applications at General Electric's Schenectady Works as the result of a clamping fixture suggested by one of the Company's workers which has many advantages.



The fixture is a positive clamp with an inserted steel jaw to prevent slipping. The "T" bolt is fitted with a coupling nut so that by varying the length of the stud used, the clamp may be employed on varying thicknesses of work. Since but a negligible amount of space is needed for fitting the "T" bolt into the table, its full length can be utilized. Previously, blocks to support the "U" clamps took up considerable working space.

The clamping fixture is being used successfully on boring mills, planers, and milling machines—and the old "U" clamp supports have gone into the scrap pile.

SEGREGATING CRITICAL MATERIALS

The Westinghouse Appliance Division, Mansfield, Ohio has developed a simple system to salvage clean, uncontaminated scrap. In addition to helping the war effort by keeping the scrap flowing back to the smelters in the best possible form, this method results in obtaining highest scrap prices, and makes it easier to obey

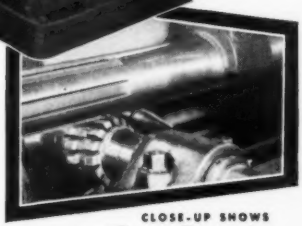
BARBER-COLMAN *Long Bed* *Type "A"* HOBBING MACHINE



HOBS SPLINE SHAFT

111" LONG

THIS is the most practical hobbing machine for work of this type. It is capable of hobbing spline shafts of this length and longer, as well as general spur and helical gear work, or worm thread milling. The job shown here is a table feed shaft for a 10-foot machine tool bed. The Type "A" Barber-Colman Hobbing Machine used has a bed that is 40" longer than standard and has two steady-rest brackets on the overarm. The shaft is of SAE 1040 ground shafting, and the spline length is 111" on a 12 foot shaft, with 6 keys having clearance grooves in the bottom. The O. D. of the shaft is 2.734/2.738" and the root diameter of the keys is 2.466/2.468". A 3" x 3" x 1¼" straight-hole B-C hob is used. Two operations, roughing and finishing, are performed, the roughing cut leaving .030" stock for finishing. Both cuts are made with a hob speed of 103.4 r.p.m. and a feed of .050" per rev. of the work. Floor-to-floor time per piece is 8 hours. The keys are held straight and parallel and given a very good finish. This is an excellent example of the outstanding performance obtainable from Barber-Colman Hobbing Machines.



CLOSE-UP SHOWS

Fine Finish...

This picture illustrates the extremely good finish obtained by utilizing the hobbing process for the cutting of spline shafts. The generating action of the multi-toothed hob cuts a large number of small chips, resulting in a smooth and accurate surface.

Buy War Bonds

BARBER B-C COLMAN PRODUCTS! HOBS. HOBBING MACHINES. HOB SHARPENING MACHINES. REAMERS. REAMER SHARPENING MACHINES. MILLING CUTTERS. SPECIAL TOOLS

Barber-Colman Company

GENERAL OFFICES AND PLANT • 207 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.



the directive of the WPB against the contamination of certain alloys.

Thruout the plant, handy bins have been placed, into which scrap is deposited by workmen. Each bin is carefully marked by signs, which not only give the general names of the materials, but also the alloy numbers, so there can be no mistake. For instance, in one section, three different types of aluminum alloy are used—17S, 3S and 2S. Each separate bin is so marked that there can be no mistake as to where scrap goes.

From the containers in which it is collected, the scrap goes to a baler. After baling the scrap is again stored in groups according to alloy number until enough has been collected for economical disposal.

YOUR FIRST LINE OF

DEFENSE against

HIGH SHARPENING COSTS

No. 57T

Automatically Sharpens Metal Saws in gangs up to 8" in diameter. Takes gangs up to 3½" thick. The saws are automatically indexed and sharpened within variation of plus or minus .001 of exact diameter of entire lot.

Write for Folder 57T.



THE WARDWELL MFG. CO.

3165 Fulton Rd. Cleveland, Ohio

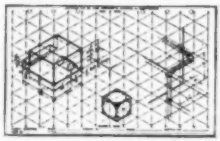
HANDBOOK ON CLEANING

Describing how cleaning, de-scaling, de-rusting, paint stripping and related techniques and procedures are being successfully used to help keep existing production, power and processing machines and equipment operating efficiently, reduce shut-down time and conserve manpower on 54 different essential plant maintenance jobs, the newly enlarged third edition of a 12-page Oakite Digest is of timely interest to plant superintendents, safety engineers, works managers and other maintenance men.

Prepared in handy data sheet form, the Digest gives representative formulas and methods designed to expedite a wide range of commonly recurring wartime maintenance work such as removing limescale and rust deposits from water-jacketed spot-welding machines and dynamometers; cleaning machine tools, die casting machines, metal washing machines, etc.; reconditioning gas welding and flame cutting tips; cleaning paint spray booths and equipment; safely cleaning and descaling heat exchangers, condensers, coolers, compressors, Diesel and gas engine cooling systems; washing concrete, wood and other type floors; cleaning air conditioning and electrical equipment; and other maintenance, repair, overhaul or repainting operations.

For free copies, address Oakite Products, Inc., 57 Thames St., New York, N. Y.

ISOMETRIC SKETCHES ARE



EASY TO MAKE AND READ!

One trial will make you another steady user of WADE'S ISOMETRIC blue lined paper. Shows all surfaces and interior to scale. Makes clear blueprints. Saves time daily in hundreds of plants. Write for Circular.

Wade Instrument Co. 1422 E. 109th St. Dept. H. Cleveland, Ohio

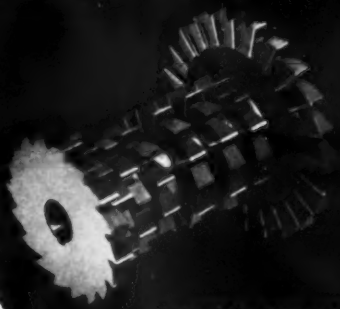
"SPECIALS

C & W
SPECIAL PRECISION CUTTERS

C&W TOOLS

Special
High-Speed Steel

COUNTERSINKS
REAMERS
MILLING CUTTERS
RECESSING TOOLS
GUN DRILLS
END MILLS
COUNTERBORES
PROFILE CUTTERS
HOLLOW MILLS
SHAVING TOOLS
INTERLOCKING CUTTERS
FORM RELIEVED CUTTERS
CARBIDE-TIPPED TOOLS



To meet the demands of the war program—ON TIME—C & W is constantly expanding plant capacity. C & W is one of the largest producers of special high-speed precision cutting tools—and has an outstanding record in meeting promised delivery schedules.

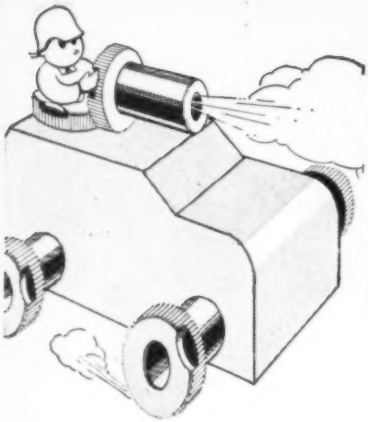


For
Aircraft—Gun—War Industries



Write for illustrated pamphlet—
Consult us on your tool requirements.

C & W TOOL COMPANY



BIG GUNS
FOR DRILLING HOLES

They're mighty small compared to a gun or a General Grant, but in building jigs for the manufacture of gun and tank parts or any other precision metal part it pays to use Universal Drill Bushings. Because of their straight and round superfinished bores, Universal Bushings save tools, wear longer and assure accuracy. Write for complete facts.

UNIVERSAL
ENGINEERING COMPANY
FRANKENMUTH · MICHIGAN

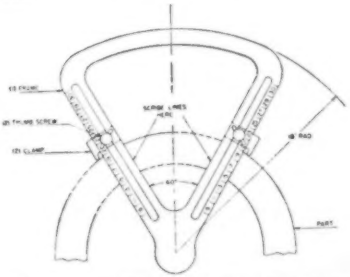
COMPETITOR SAVES PRODUCTION TIEUP

Another example of American industry's pulling together in the war of production came to light the other day when Revere Copper & Brass, Inc., Baltimore, Md. was threatened with a production shutdown because of the failure of a d-c armature in a gear-motor. Rebuilding the armature would have taken several days —getting a new one, several weeks.

On order with General Electric and ready for delivery to the Bridgeport Brass Co., was a gear-motor with an armature identical with that needed. Contact with Bridgeport Brass resulted in that Company's gladly offering the armature from the new gear-motor to the Revere, who were thus able to get their gear-motor back into service in short time. The switch meant that the delivery of Bridgeport's gear-motor had to be delayed several weeks.

Simplifies Scribing

A layout tool, devised at General Electric's Schenectady Works to simplify the scribing of a metal packing ring that must be sawed into six equal segments, can be adapted easily to facilitate similar jobs.

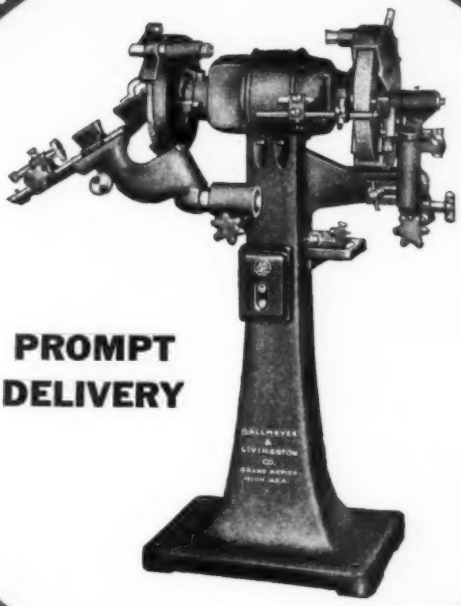


The tool as built by G. E., has its two arms at a 60° angle inasmuch as the rings are cut into six segments, and it has a radius of 18" to accommodate ring diameters ranging from 9 to 31". Each arm is marked with a scale in ¼" graduations to correspond with the various outside diameters of the rings handled. The arms are slotted, and a movable clamp can be set and locked at the desired position along each arm by tightening a knurled thumb screw.

To use the tool, it is only necessary to measure the outside diameter of the ring to be cut, and then set the clamps at the corresponding measurement marked on

GRAND RAPIDS NO. 10-B

COMBINATION TWIST DRILL AND TAP GRINDER



PROMPT DELIVERY

Other Combinations also available

Catalog on request

This precision machine tool not only conserves Hi-Speed Taps and Drills but also assures more accurate holes between regrindings.

Sharpens Taps, 2, 3, and 4 Flute, Right or Left Hand. Sizes No. 6 to 1½ inches.

Sharpens Drills, 2 and 3 flute, Straight or Taper Shank. Sizes ⅛ to 1½ inches.

GALLMEYER & LIVINGSTON CO.

405 STRAIGHT AVE. S. W. GRAND RAPIDS, MICH.

NO LONGER A SHOP PROBLEM!





His shop problem is solved—the Thompson Universal Milling Fixture did the trick. Converts any bench lathe into an accurate, time-saving milling machine. Just set-up the "Thompson" on the lathe bed—slip on a stock index plate—and you're ready to turn out indexed work, fast, with no chance for error—the indexing is fool-proof. And the 3-way circular swing provides exceptional maneuverability—produces a wide variety of end mills, reamers, splines, punches and special cutters. Flat stock may be milled plain, straight or angular, by using the vise without the indexing unit. *Write for further information.*



Awarded to Auto-Ordnance Corporation for excellence in production of "Tommy" Guns.

TRADE-MARK
Thompson
REG. U.S. PAT. OFF.

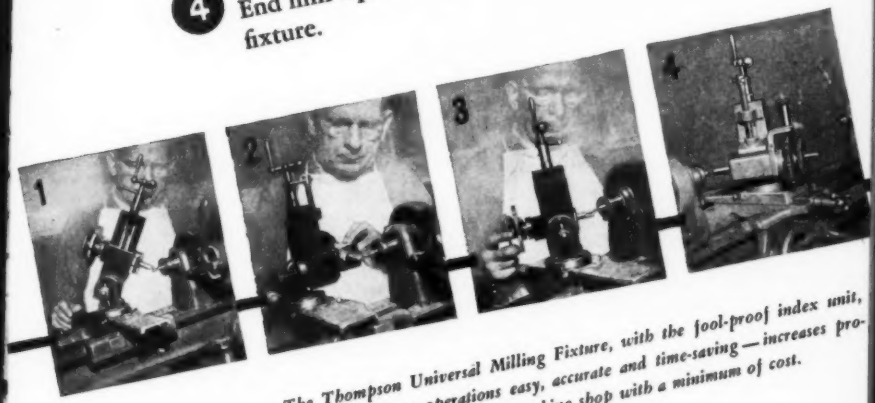
AUTO-ORDNANCE Corporation

THOMPSON TOOL DIVISION

342 WEST PUTNAM AVENUE, GREENWICH, CONN.

THE THOMPSON UNIVERSAL MILLING FIXTURE, WITH THE 3-WAY CIRCULAR SWING AND FOOL-PROOF INDEXING.

1. Index fixture tilted at 30° milling end teeth in cutter.
2. Fixture and base at right angles milling straight teeth in cutter.
3. Base of fixture on 30° angle milling end teeth in cutter.
4. End mill operation showing work extended through fixture.



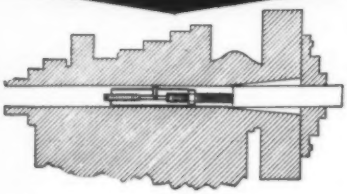
The Thompson Universal Milling Fixture, with the fool-proof index unit, makes the above operations easy, accurate and time-saving—increases production in any tool room or machine shop with a minimum of cost.

AUTO-ORDNANCE *Corporation*

THOMPSON TOOL DIVISION

342 WEST PUTNAM AVENUE, GREENWICH, CONN.

NOW!
SPEED WAR PRODUCTION
with this NEW
CARLSON No. 101
SPINDLE LATHE STOP



Here is an amazing new attachment which greatly simplifies lathe operation, especially in mass production work. Easily attached in few seconds. Inexpensive. Sizes to fit lathes of all types and makes.

- Increases and Speeds Production
- Reduces Rejects
- Saves Set-Up Time
- Assures Uniform Accuracy
- Requires Only Semi-Skilled Operator

MODEL No. 101—Fits all bench-type lathes including South Bend, Logan, Atlas, Sheldon and other makes..... 5.95

ORDER TODAY! Please give type of lathe and inside diameter of lathe spindle.

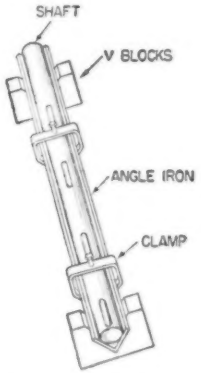
SOLE AGENTS
SCHULTZ & ANDERSON CO.
109 EDISON PLACE, NEWARK, N. J.

Manufactured by
GREENFIELD MACHINE AND TOOL WORKS

each arm. The operator then scribes a line across the ring along the outer edge of each arm, and using each line scribed as a guide for the next one, completes the layout in five moves of the tool around the ring.

Keyway Cutting Fixture

A simple angle-iron fixture developed at General Electric's Schenectady Works overcomes the problem of misalignment in cutting the keyways in a 3" diameter, 6-ft long cam shaft, and permits a small machine to do a job ordinarily requiring a large spliner.

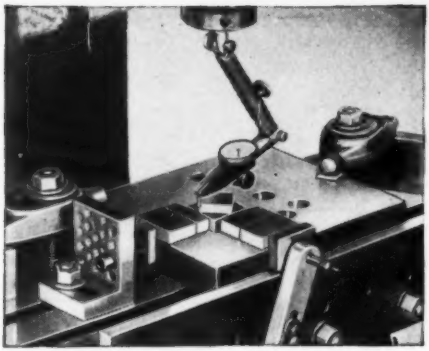


Previously, even with the utmost care, the operator was unable to machine the keyways so that they did not need correction. Most of the error was caused by the fact that only one or two keyways could be cut with one setup.

The angle-iron fixture which eliminated these difficulties was planed on its four surfaces, and clamps were made for holding the shaft in place in the angle. Two keyways are cut, and then the shaft and fixture moved along in the vee blocks to the next setting. With the work done while the shaft is held in the fixture, the keyways are in line and remain that way after the shaft is straightened.

Servicing For Dirty Goggles

An arc-welder at the Westinghouse Sharon Works steps up one of the conveniently located soap and paper dispensers to clean his goggles. A drop or two of the cleaning solution and a piece of paper quickly does the job. It was apparent that without such facilities placed in



NOW—Accurate Jig Bore Locating —to Within a "Tenth" or *Less!*

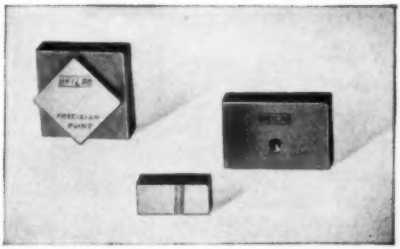
PRECISION POINT LOCATER

Do a *better* job . . . *faster!* PRECISION POINTS locate hole centers for jig boring more accurately . . . quicker . . . easier, than you ever before thought possible! PRECISION POINTS are narrow ledges of just the right width, over which indicator points operate with supreme accuracy —so accurately that "tenth" indicator needles "repeat" exactly! Locater and Edge Plates wring to gage blocks . . . are held in exact relation, even when set-ups are not quite square. Can be set up against parallels and angle plates for irregular-shaped work. Locater size 1.200 in. Maximum accumulated error ±.000,050 in. THE MASTER STANDARD.

Accurate—Utilizes the absolute accuracy of the wringing principle. Locates holes from the same work edges from which inspection is made—no chance for error. Functions at work piece temperature.

Quick — Locates in two directions at one setting.

Easy—Indicator face sets horizontal — always in view by operator from one position.



$40.00 Per Set Set consists of PRECISION POINT LOCATER, two Edge Plates, and directed pressure tool for wringing.

Brill Industrial Laboratory

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PRODUCT DEVELOPMENT • PRECISION TOOLS

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CHICAGO


STEP PULLEYS


SINGLE GROOVED PULLEYS


VARIABLE PITCH PULLEYS


MULTIPLE DRIVE PULLEYS


HAND WHEELS


FLEXIBLE COUPLINGS


SELF-ALIGNING SHAFT SUPPORTS

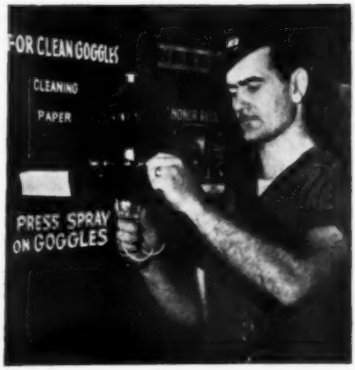

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Manufactured By
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H. A. HOLDEN CO.
300 4th AVE., So. Minneapolis, Minn.

CATALOG ON REQUEST



strategic locations, workers were apt to wear goggles longer between cleaning than they should, with the result of a pronounced drop in vision efficiency.

Cleaning stations consist simply of standard type dispensers for the solution and paper mounted on a board, that is readily located by identifying signs.

Speeding Inspection

Finished dimensions can be inspected more quickly and accurately with a modified indicating gage, according to the General Electric Co. Snap gages have limitations in that the older fixed-type



RECOMMENDED PROCEDURE

1. MACHINE END FACE
2. DRILL HOLE
3. BROACH HOLE
4. FINISH END FACE AND CONTOUR LOCATING FROM BROACHED HOLE



COMMON PROCEDURE

1. MACHINE END FACE
2. DRILL HOLE
3. MACHINE CONTOUR LOCATING FROM DRILLED HOLE
4. BROACH HOLE

How to get more accuracy by Broaching----------

5. BY PROPER MACHINING SEQUENCE.

THE drawing used at the left illustrates a broaching principle.

To get the most out of broaching—don't expect a broach to correct eccentricities or lack of squareness created by previous machining sequence. Broach your holes and surfaces FIRST and then use these surfaces to locate from.

This is one of the "Do's and Don't's on Broaching" available in printed form in bulletin board size. Write for a copy today. Ask for Bulletin No. 274.

colonial BROACH COMPANY

Broaching Machines — *Broaches-Broaching Equipment*

DETROIT..... U. S. A.

Don't Overlook This Possibility for Increased Production!

NICHOLSON EXPANDING MANDRELS

Save Time — Improve Shop Efficiency



TYPE A—STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

No.	Range of Bores Taken	Net Price
1A	½" to 1"	$12.00
2A	1" to 1½"	16.00
3A	1½" to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00



TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

No.	Range of Bores Taken	Net Price
1x	½" to 9/16"	$10.00
2x	9/16" to 21/32"	11.00
3x	21/32" to ¾"	12.00
00	¾" to ⅞"	14.00
0	⅞" to 1"	16.00
1	1" to 1¼"	18.00
2	1¼" to 1-9/16"	21.00
3	1-9/16" to 2"	29.00
4	2" to 2½"	40.00

(Other Sizes Taking Up to 7" Bores)

Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

W. H. NICHOLSON & CO.

117 OREGON ST., WILKES-BARRE, PA.

flat gages with "go" and "no go" slots become worn and sprung with use and lose their accuracy.

R. E. Hulse of the G-E screw machine department at Schenectady sought and found a better method for checking groove diameters close to a shoulder on a shaft. He added a slender blade and lifting lever to the plunger of an indicating instrument, and a similar slender (1/64") blade projecting up from the base holding the gage. The blades proved so satisfactory that use of such gages was expanded to checking both diameters and out-of-roundness of many types of shafts having a series of different diameters—several snap gages would be required for one shaft, and they would not indicate the degree of out-of-roundness.

For inspecting shafts without grooves, Mr. Hulse produced a similar attachment for a standard indicating gage, with a slender blade on only the instrument plunger.

It is also possible to check classes of thread fits with these indicating gages, employing blades shaped to the thread contours. Threads can thereby be checked for taper right up to the shoulder.

Portable Tool Crib

A portable tool crib saves time and hundreds of steps a day at General Electric's Erie Works for Joseph Macaluso and William Gross, who built the crib from metal salvaged from operations in their building. Shelves, trays and doors are arranged to accommodate all of the tools required by the men in their work, and the crib can be rolled to the job location. The men built the tool crib during spare minutes in the shop.





Practically every firm engaged in war production will find this Ex-Cell-O heavy-duty tool grinder answering a definite need. It provides for a 14-inch wheel at each end and is specifically suited to the proper conditioning of medium and large size turning, boring, facing, and planer cemented carbide tools, as well as stellite and high speed steel tools. Ex-Cell-O Standard Style 49 Tool Grinder is built for dry grinding, or it can be supplied, as extra standard equipment, equipped for wet grinding. Write for Bulletins Nos. 46511 and 46101. They give specifications and other information on Ex-Cell-O's complete line of Tool Grinders.

EX-CELL-O CORPORATION • DETROIT

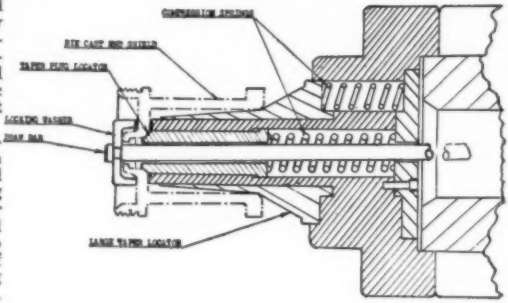
XLO
EX-CELL-O for PRECISION

EX-CELL-O *Precision* MACHINES AND TOOLS

CHUCKING AND CENTERING

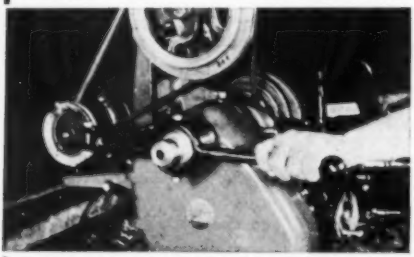
The chucking of pressure die castings for small motor end shields is accomplished easily and accurately through a special chucking fixture developed by A. J. Green, a general foreman at a General Electric plant manufacturing aircraft parts.

The fixture employs a spring-mounted tapered plug and a similarly mounted tapered ring which locate the bearing bore and the edge of the stator fit. The end shield is located against a three-point stop which contacts the inside of the end flange, evenly dividing excess stock in the casting. The end shield locates first against the spring mounted plug, assuring a concentric location of the outer end, and then is pushed back until it locates solidly against a three-point stop. Coincidentally, contact is made at the inner end on the large taper locator, obtaining a concentric location of the large fit. The air-operated draw-bar pulls a horseshoe washer which has three locating points directly opposite the point on the stop.



This arrangement permits the casting to be held solidly without stressing any of the weaker sections, since the holding force is applied directly in compression against three points through the end flange. When the air cylinder has drawn up to its full stroke, the casting is held accurately and solidly, and the resulting turning operations may be done quickly and accurately without necessitating the

LATHE PRODUCTION Will be Increased



WITH THE RECOR LEVER COLLET CLOSER

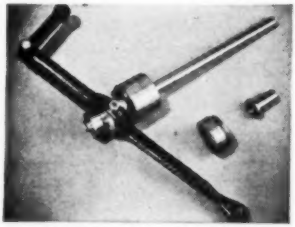
•

FEED AND RELEASE BAR STOCK THRU THE COLLET WITHOUT STOPPING LATHE

Easily attached to Logan, S. B., Atlas bench lathes having a No. 3 Morse Taper in the head stock. Will feed any length stock from 1/64" to ½" through the spindle, but step collets can be made to accommodate larger diameters and used for second operations only.

Gripping action is adjustable to desired tension without loss of time.

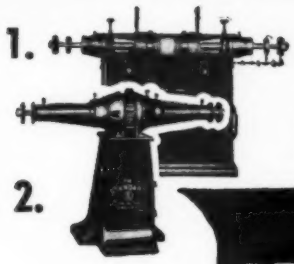
The ReCor Lever Collet Closer is precision machined from finest materials obtainable and will last indefinitely. All parts hardened and ground where necessary. Cam is mounted in a ball bearing to insure smooth running. *Write or wire today for details.*

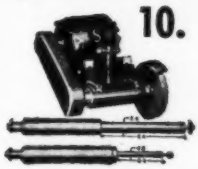


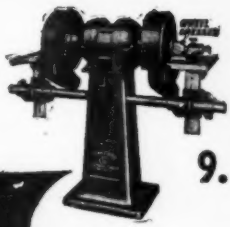
Collet Closer with fittings ready for installation

10 DAY DELIVERY

RECOR MFG. CO., 430 S. GREEN ST. CHICAGO, ILL.







It's

STANDARD GRINDERS

for

PRODUCTION • ECONOMY

1.-2. Buffers, Polishers. ½ H.P. to 25 H.P. Direct and Belted motor drive.

3. Carbide Tool Grinders, wet or dry. Twelve models.

4. Double End Wet Grinders. 12" to 24" diameter wheels.

5. Speed lathes. All types and sizes. ½ H.P. to 5 H.P.

6. Tool Post Grinders, direct and belted motor drive.

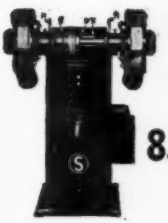
7. Pedestal Grinders. ¼ H.P. to 15 H.P.

8. Multiple Speed Grinders, belted motor drive. 10" to 30" wheels.

9. Disc Grinders. 10" to 30" diameter discs.

10. Tool Post Grinders, direct and belted motor drive.













The STANDARD ELECTRICAL TOOL *Co.*

CINCINNATI • OHIO

Write for Catalog No. 43

249 River Road

use of highly skilled or experienced operators.

Tool Life

Much needless destruction of tool edges and consequent shortened tool life is caused by poor surface conditions of the work to be machined. This fact is not always appreciated when premature dulling of tools is encountered in the shop.

Poor surface conditions may have various causes, such as:

Castings may have sand pockets in the surface or have sand or other foreign materials actually imbedded in the same. Chilled spots often occur, too, in the surface of castings, and these are as destructive of tool edges as are foreign materials.

Forgings may have hard oxide scales, either tightly adhering to, or actually imbedded in the surface. Hard spots in the surface of forgings may occur with some types of materials.

Bar stock may have the same poor surface conditions as forgings.

All of the conditions cited have one thing in common, namely, that they cause rapid dulling of tool edges.

The cure is to see to it that surfaces of work to be machined are properly conditioned beforehand. This may be accomplished by blasting, tumbling, pickling, washing, normalizing, annealing, or a combination of these operations, as called for.

On the operating side, it should always be remembered that there is a distinct saving of tool life by making the tool cut under the surface at all times. If tools are allowed to scrape or rub on the surface of the work, the edges will dull quickly even with reasonably good surface conditions.

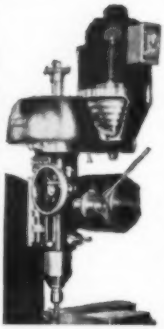
It should be realized that in these times of critical shortages of tools and tool materials, any steps that will prolong the life of tools are distinctly worthwhile, both from cost and conservation standpoints.

This data is taken from Engineering Bulletin No. 191, published by National Twist Drill & Tool Co., Detroit.

Fibre Forming Plugs

Fibre has been used to replace tool steel in the making of plugs used in forming end windings for small instrument-type motors in manufacture at one of General Electric's plants. The fibre, because of its resilience, was found to offer excellent resistance to wear and to have less tend-

MILLING - DRILLING - BORING ATTACHMENT
for
Heavy Duty Operations



Uses many types of cutters on a wide range of work. 1/16" to ¾" end mills.

FEATURES

Large size spindle with No. 9 B&S Taper. Large Quill Diameter with a travel of 4". Furnished with ½ h.p. motor.

The aluminum pulleys provide a range of six speeds, from 250 to 3000 R.P.M. The spindle takes 1/16" to ¾" end mills. Quill is counterbalanced and hardened and ground. Overarm brackets equipped with spreader screw for easy mounting.

PROMPT DELIVERY

Send for Descriptive Folder.

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4840 North Avenue, Chicago, Ill.

Rotary Files

These files are available in a number of different styles and sizes, in either High Carbon Steel or High Speed Steel.

Send for catalog showing a wide variety of standard shapes and special shapes. Perhaps we have what you want in stock, if not, we can grind it.

The Rotary File Co.



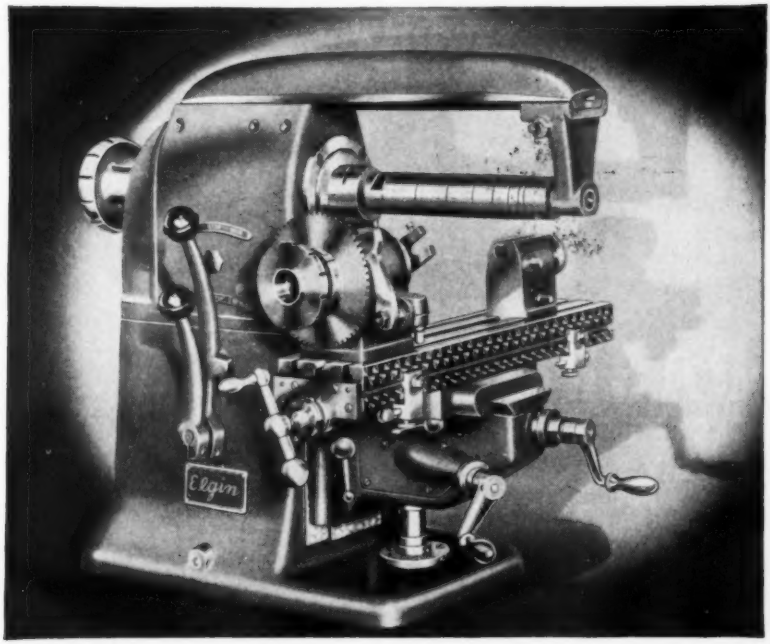
Hand Cut

If you have need for special shape Files, we shall be glad to submit the desired File for your approval and trial upon receipt of a sample or sketch.

This service is designed especially for your convenience, for which we make no charge.

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Precision

BENCH MILLING MACHINES

ELGIN TOOL WORKS

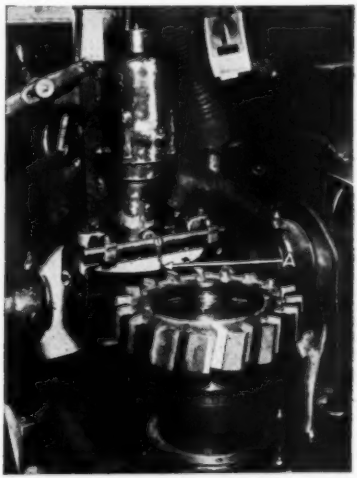
1772 BERTEAU AT RAVENSWOOD AVE. — CHICAGO, ILL.



ency to short circuit the end turns of the stator windings. As a result of this change, demand for a critical material has been decreased, while half the cost of the forming plugs has been saved because of lowered material and processing cost.

Cutter Grinding

A simple but ingenious idea that improved the consistency as to accuracy with which milling cutters could be sharpened, is shown in the accompanying illustration. The grinding machine is provided with a finger (A), tipped with Carboloy cemented carbide that follows the contour of the tooth and thereby guides the grinding wheel. Guide fingers made of alloy steel, it has been found, wore away very rapidly as they rubbed across the contact surface of the cutter teeth, necessitating frequent adjustment or replacement.



To correct this, a carbide tip was brazed to the tip of the finger, after milling from the tip an amount equal to the thickness of the carbide blank. The hardness of the Carboloy cemented carbide assured the number of adjustments required by vastly increasing life of the finger.

Reamer Speeds War Production

A 62-year-old grandfather's idea has made it possible to step-up production of steel caps for armor-piercing shot to blast



WITH THIS NEW KELLERFLEX HIGH SPEED HANDPIECE

THE new Kellerflex Heavy-Duty High Speed Handpiece will triple the present spindle speeds of certain models of Kellerflex Machines — *without increasing cable speeds.* With it, speeds of as high as 20,000 R.P.M. are easily obtained.

For high speed polishing jobs using small polishing bobs—for high speed grinding where small wheels or grinding points are used — or on any cutting or polishing job where extremely high spindle speeds are required — this new Kellerflex High Speed Handpiece will prove itself a valuable, time-saving addition to your equipment.


Kellerflex
Model JB-1

Regular Kellerflex machines having cable speeds ranging from 2100 up to 6800 R. P. M. may be boosted to spindle speeds of 10,800, 15,400, or 20,000 R.P.M. by the quick attachment of this new handpiece. Fits all present Kellerflex machines having 5/16" or 3/8" cables. Immediate delivery. Write for full details.

PRATT & WHITNEY
Division Niles-Bement-Pond Company
WEST HARTFORD · CONN.



FOUL COOLANT: THE DANGER SIGNAL!

When soluble cutting oils are mixed with water, the resulting coolant emulsion becomes an excellent breeding place for bacteria. A fresh, clean emulsion may within a few hours contain millions of bacteria per cubic centimeter. Result: foul odor and spoilage which may mean serious economic loss—also the danger of infection of valuable, skilled help.

Dolge Steridols are special cutting oil germicides — specified for your particular needs ONLY after bacteriological and chemical examination of samples from your machines has indicated the need and correct type. Write for free booklet Q-9, which describes this important service. Do it today.



For cutting oil sanitation

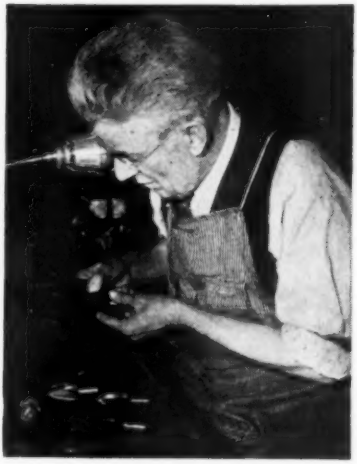
DOLGE STERIDOL

The C. B. DOLGE Co.
Westport, Connecticut

Axis tanks, according to C. L. Van Derau, Works Manager of the Westinghouse Mansfield, Ohio plant.

Gray-haired Daniel Bemiller, grandfather of 12 children, designed a tool which eliminated a drilling operation previously requiring 9,300 hours of work a year, thus freeing workmen to spend this time making thousands of extra steel caps.

This tool, a special reamer, shapes the inside of a pointed cap that fits over the nose of anti-tank shot. Formerly it was necessary to use both a reamer and a drill to do the job.



The veteran tool maker also figured out a way to utilize worn cutting tools used in making armor-piercing shot. He designed an adjustable bushing which makes use of cutters that become shorter than their original length when reground.

For these two suggestions Mr. Bemiller received a check from Westinghouse for $649, representing 10 per cent of the annual savings resulting from his ideas. He also got a special citation from the Labor-Management Committee at the Westinghouse plant and his name went to Washington as a candidate for a "Production Soldier" medal" from the WPB.

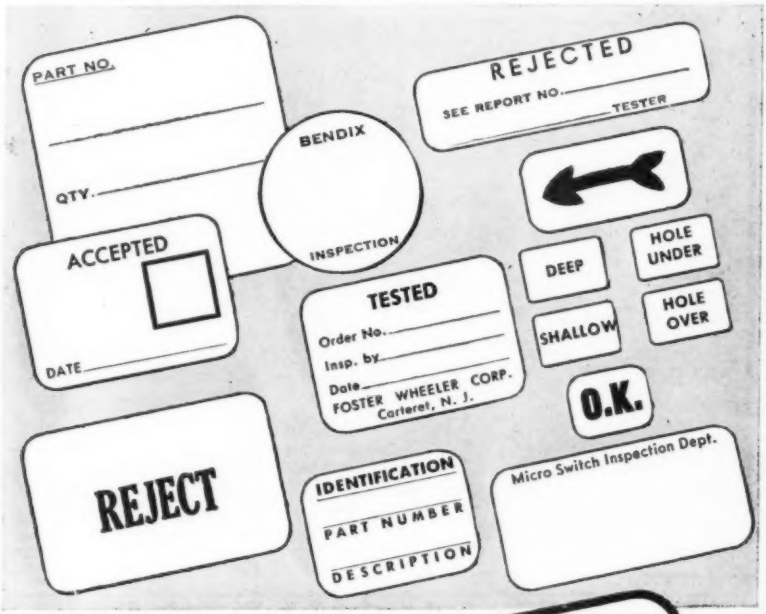
Threads Lapped In Tapping Machine

A standard tapping machine is used to perform the delicate lapping operations on

INSPECTION STICKERS
REJECTION STICKERS
IDENTIFICATION STICKERS
INSTRUCTION STICKERS

MAGIC KUM-KLEEN STICKERS STOP ERRORS, SPEED PRODUCTION

Simply press on—no moisture required—adhere to any smooth surface (can be applied directly to products in production)—never pop off—yet are easily peeled off.



Magic Kum-Kleen Stickers won't pull off like string tags, fall off like wet stickers, rub off like chalk marks, pull out like pins.

Write today for free samples.

AVERY ADHESIVES, Dept. MTBB-6,
451 East Third Street, Los Angeles.

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AVERY
Kum-Kleen
DRY LABELS

DOUBLE YOUR DRILL PRESS CAPACITY
Minutes are Seconds with the new TWISTITE Vise.
Opens to full capacity in one second.
Speed Defense Production with this New Vise.



J. A. Richards Co., Kalamazoo, Mich.

BURKE
MILLING MACHINES
Make Fast Work of Small Jobs

Motor Driven

Timken roller or ball bearings to spindle

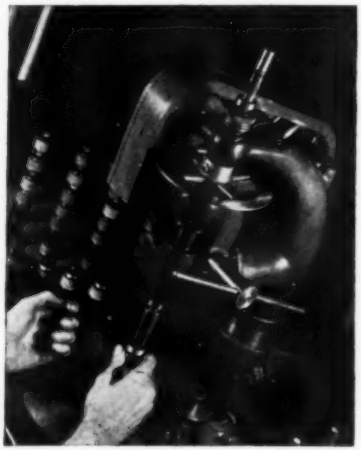


Write today for circulars.

Burke Machine Tool Co.
297 E. 16th St., Conneaut, Ohio

female threads in aluminum parts at the Mansfield, Ohio, Westinghouse plant.

The problem is to avoid applying excessive pressure and destroying the soft threads. While the lapping compound is applied, by means of a brush, with the left hand, the part is firmly held against the lap which is mounted on the end of the tapping machine spindle.



Threads are lapped to the proper fit by passing the female threads up and down over male threads on the lap by utilizing forward and reverse speed of the machine spindle.

NITRIDING TOOLS

A final nitrided case for taps, reamers, bits, rifling cutters and other small tools is reported to be doubling and trip-

FLEXIBLE ABRASIVE WHEELS



Designed for precision work where flexibility is required, these wheels are useful accessories for sanding and finishing regular and irregular jobs, penetrating into difficult recesses, lapping holes in dies, finishing various shapes of metal, wood, rubber and plastic parts.

Useful for finishing propellers in aircraft construction. Descriptive bulletin and sample wheel will be sent on request. Prompt Deliveries.

FIELD ABRASIVE SPECIALTY MFG. CO. **203 LOWE BLDG., DAYTON, OHIO**

MODERN-MAGIC

QUICK CHANGE CHUCK AND COLLET EQUIPMENT



Has reduced the idle time of revolving spindles to practically zero. With this chuck in revolving spindle machines, tools can be changed while the machine is running without stopping or even slowing down the spindle.

Send for a copy of Bulletin M-101 which describes Modern Chuck and Collet Equipment.

CONSOLIDATED MACHINE TOOL CORPORATION

MODERN TOOL WORKS

DIVISION

ling tool life in quantity production. After hardening and grinding, the tools are cased to a depth of one or two thousandths by immersion in a bath of E.F. Houghton & Co's., Liquid Heat 720. Temperature is customarily in the range of 1050-1150 F, with treatment running from 10 to 60 minutes. The nitrided case is particularly helpful for tools used in the machining of shells and gun parts and in other jobs under high production schedules demanding the minimum in tool changes. Further details are available from the Houghton Co., at 303 W. Lehigh Ave., Philadelphia.

SHIELDED SCREWDRIVER BIT

All small assembly operations in which fillister or round head screws are used can be facilitated by the use of a shielded screwdriver bit developed by F. Capello, a methods man at General Electric's Schenectady Works.

A standard straight screwdriver bit is used and the shield consists of a thin bushing which is pressed over the bit to completely shield the working surface of the screwdriver. This arrangement keeps the screwdriver centered on the screw and thus largely eliminates the possibility of burring the slot or slipping off the screw and thus marring the finished surfaces. This type of bit can be used in either manual or power-driven screwdrivers.

SAVING MATERIALS AND TIME

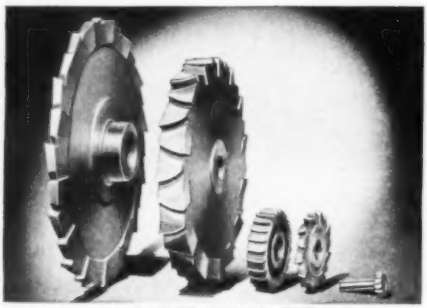
By substituting welded steel pipe for copper tubing, and by eliminating fittings in favor of welding, a saving of 20,000 pounds of copper was achieved in its manufacture of power rectifiers during 1942, the General Electric Co., has announced. In addition there was a reduction of some 2500 man-hours.

Further savings in both material and time—33,200 pounds of copper and 600 man-hours—were effected by a redesign to improve the arrangement of cathode bus-bars of the rectifiers,

Steel was also saved. Substitution of steel plate construction for channel yielded savings of 6400 pounds of steel and 2700 man-hours in manufacturing rectifier bases.

CHANGE IN STUD SAVES MATERIAL AND TIME

A new method introduced at one of the General Electric plants for the manufac-



PATENT APPLIED FOR

ABER

SPECIAL

Curved Tooth

MILLING CUTTERS

with

"CHATTERLESS FLOWING ACTION"

- Higher Speed (R.P.M.)
- Longer Cutting Surface
- Longer Life

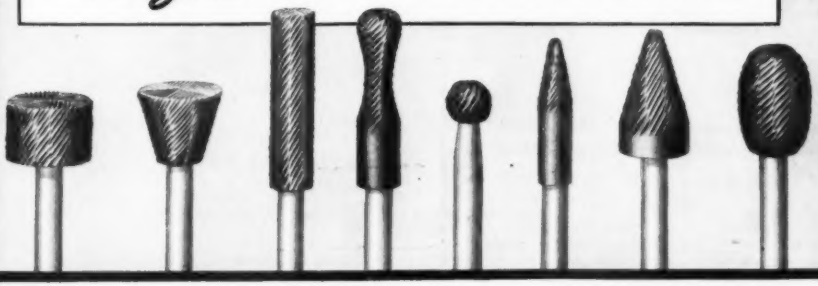
There is no lapse of cutting contact. Each tooth begins to cut just as its predecessor is finishing its cut. The continuous shearing is known as "Chatterless Flowing Action." Smooth, accurate finishes are maintained. Increased speed (RPM) means increased production. Save time and money with ABER curved tooth milling cutters.

WRITE FOR LITERATURE

ABER ENGINEERING WORKS, INC., WATERFORD, WIS.

FORD

A *Right* TOOL FOR EVERY FILING NEED



8 of many available shapes

Ford devotes its entire attention to the *one* job of making better rotary filing tools.

Special methods produce hard biting, fast cutting tools that stay sharp longer —and stand up longer.

Because neither hand cut files nor ground cutters are all purpose filing tools, we make *both* types. Each has its specific applications. If in doubt, consult our engineering department.

Look into this *complete* line.

Catalog showing many shapes and sizes sent on request. M. A. Ford Manufacturing Company, Inc., 746 W. First St., Davenport, Iowa.

Ground Cutters — miniature milling cutters of high speed steel, ground from solid after hardening. Perfectly balanced. Can be resharpened many times to original keenness.

Rotary Files — hand cut from a special grade of high speed steel. Scientifically heat treated after teeth are cut.

THE MARK OF A GOOD FILE

FORD

GROUND CUTTERS ★ ROTARY FILES

On The Level

they're better!



Simplex Machinists' Jacks speed leveling of work on planers, milling machines and other machine tools. Notched base for fastening to bed. Self-leveling ball and socket cap. Side lock nut holds screw at desired height. 4 sizes: 2¾", 3¾", 5¼" and 7½" closed heights.

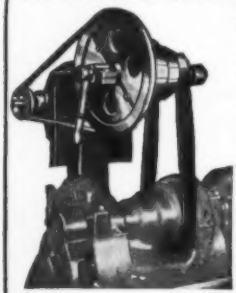
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Templeton, Kenly & Co.
Chicago, Illinois
Better, Safer Jacks Since 1899

Simplex
LEVER · SCREW · HYDRAULIC
Jacks

STEEGE MOTOR DRIVES FOR DEFENSE GUARANTEED FOR FIVE YEARS

No chance of breakdown, doing a good job powering machines for defense production. No noise, floating cone, results 100% power. 8 years of production proof of durability. Easily installed.

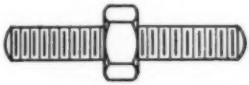


PRICED AT $40. AND UP. FOR LATHES, SHAPERS, MILLERS, ETC. IMMEDIATE DELIVERY. *Send for descriptive pamphlet.*

W. L. STEEGE MACHINERY CO.
100 So. Jefferson St., Chicago, Ill.

ture of a center stop brass stud is reported to have effected a 46 per cent saving in brass, and a 13 per cent net saving when considering both material and labor. At the same time, it has been found that the stud of new design is just as satisfactory for the application as was the stud previously used.

OLD METHOD



Machined from hexagonal stock

NEW METHOD



Center crimped, thread rolled, and hexagonal nut run against stop

The stud had been made out of 5/16" hexagonal bar stock. The shank was turned on an automatic screw machine, leaving the necessary stock at the center to form the stop, and the shank was then threaded on a hand screw machine.

The new stud is made from small-diameter round stock. Brass rod of 3/16" diameter is formed on a cold header to have a crimped center and a rolled thread. The hexagonal nut is made separately and assembled against the crimped center of the stud.

BURR KEYSEATERS



Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON
429 Kent Ave., Brooklyn, N. Y.

IT'S 2 TO 1 *in favor of*

HANSEN HOSE CLAMPS

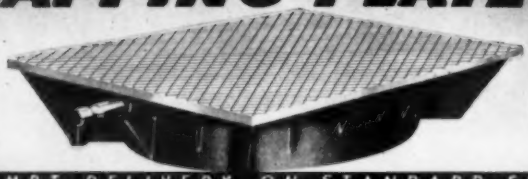


CUTAWAY SECTION OF HOSE CLAMP

Hansen hose clamp has a 2 to 1 advantage over other compression type hose clamps because they grip on the inside as well as the outside of hose. They will handle a working pressure of over 500 pounds. Anyone can install them in a few minutes, requires no special tools and can be used many times over. There again, is *time savings, air savings* and *real economy* with Hansen equipment. • • • Send for free catalog.

HANSEN MFG. COMPANY
1786 EAST 27th STREET
CLEVELAND, OHIO

Smith PRECISION LAPPING PLATES



PROMPT DELIVERY ON STANDARD SIZES

These precision lapping plates are designed for developing a true plane of close tolerance, insuring a perfect fit when lapping metal to metal joints, and all other uses requiring accurately lapping surfaces. Cutting surface comprised of diamond shaped areas. Scientifically designed for close tolerance lapping.

AVAILABLE SIZES

8" x 12"	20" x 30"
9" x 14"	24" x 36"
12" x 18"	30" x 36"
18" x 18"	30" x 60"
18" x 24"	36" x 68"
24" x 24"	48" x 96"



Smith Surface stands make ideal working units.

SMITH TOOL AND ENGINEERING COMPANY
854 N. SANDUSKY AVE., BUCYRUS, OHIO

PRECISION MEASURING EQUIPMENT

Immediate Delivery! High Speed Lathe-Centers!



CARBIDE TIPPED TOOL BITS

All standard sizes. Highest quality made. In ordering specify materials on which they will be used.

Full Line of Cutting Tools.

Taper Shank No.	0	1	2	3	4	5
Net Price	1.58	1.80	2.48	3.15	4.50	8.55

Hardened high-speed steel points. Can be operated at a high rate of speed without danger of burning. Accurately and smoothly ground overall. Included angle of 60°. Morse-taper shank. The straight section behind the point permits regrinding when worn or chipped.

IDEAL LIVE CENTERS (All Sizes)

Made to precision standards. Three interchangeable male or female inserts. All parts hardened and ground.

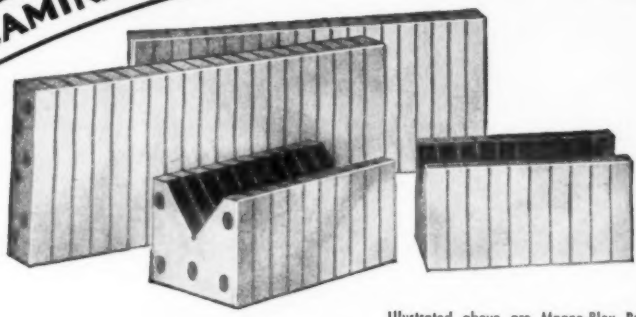
ASH & COMPANY

Cutting Tools — Factory Supplies
3939 GRAND RIVER, DEPT. B. DETROIT, MICHIGAN

We Specialize in Making **SPECIAL REAMERS** to Specifications.

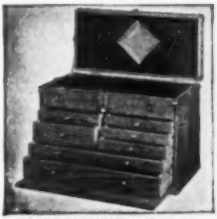
MAGNE-BLOX

LAMINATED PARALLELS and V BLOCKS



Illustrated above are Magne-Blox Parallels 1" x 3" x 7¾". Price, $29.50 pair. Magne-V-Blox 1¾" x 2⅜" x 3⅛". Price, $26.50 pair. *Above prices net F.O.B. New York.*

Magne-Blox are designed for holding work for surface grinding operations. When placed on the plane surface of a magnetic chuck they obtain their holding power by conduction, exerting virtually the same force as though the work were on the chuck itself. MAGNE-BLOX ARE A NECESSITY FOR EVERY SURFACE GRINDING MACHINE. Order sizes shown above today.



GS TOOLCHESTS. 8 types available. Write for folder.

Other Tool Specialties



REED Micrometers. Made in 1", 2", 3", 4" sizes. Write for folder.



MACHINISTS' Tools. For precision work of all kinds.



RADIUS DRESSER. For dressing grinding wheels. Price $46.00 complete.



GS DIAL INDICATORS complete with attachments, $18.00.



MAGNE-BLOX Set. Small, universal size $14.50 as illustrated.

GEORGE SCHERR COMPANY, INC. 122 LAFAYETTE ST., NEW YORK, N. Y.



CROWNING

Speak of crowning, and the average mechanic will think of pulley crowning. Purpose of pulley crowning is simply to provide larger diameter at center of pulley, as a belt always tends to run to the largest diameter on a pulley.

In pulley crowning, a good lathe is usually the first choice, unless it happens that pulleys are quite small, and are to be crowned in large volume. However, where a suitable engine lathe is not available, or where an automatic cannot be turned put on the job, some shops have devised special tools and fixtures to bring the work within scope of some other machine. It has been done in a drill press, using a milling cutter, and it obviously can be done on a milling machine, using a cutter with the proper curve, and a special attachment for rotating the pulley under the cutter.

In one shop some years ago, a special crowning tool was rigged up for use on the turret lathe, to describe the necessary arc, first up then down, as the tool was fed toward the revolving pulley.

In another case, pressed-steel pulley rims were crowned in the press, using a special bulging die.

The die body was made to contain the proper crown, and so it would open to release the pulley rim after crowning.

The punch carried a large cylindrical rubber bulging pad, which had barely enough clearance to enter the pulley rim in the die. As the rubber pad struck bottom, and the punch descended somewhat further, the rubber was expanded and forced the pulley rim outward to fill the crowned die all around.

Then, as the punch ascended, the rubber contracted and passed freely out of the pulley rim, after which the die was opened and the rim released.

Note: Machines described identified on request. Ed.

CONTINUOUS OPERATION

The idea of continuous operation has always been intriguing. Were it not worked out in various forms, the cost of many products would be much higher than at present.

There is a large line of metal goods, for instance, made of sheet metal in coiled form by continuous feeding from reels into machines performing many operations on it as it passes through.

Some of these multi-slide machines are marvels of ingenuity. They perform various punching, stamping and forming operations on the material before it drops from the equipment finished or semi-finished. In some cases, the same machine makes two or more parts of sheet metal and assembles them. There are different makers of this type of machine in general. Some machines that are very similar are designed chiefly for working and forming wire into different products.

Continuous drilling has quite often been applied on small parts. The usual setup is either a dial - feed mechanism, indexing automatically and continuously, to bring one work-station after another into position where tools advance for machining; or a rotating work-holder in a vertical plane, with drills advancing horizontally to the work.

One machine of the latter type is hopper fed, with an in-feed cam for the drills, providing sufficient travel to take care of drilling the thickest material there is to be handled on a given machine. Eight ball-bearing drill spindles are arranged horizontally and in circular formation in a rotating drum.

In-feed cam mentioned is a stationary ring cam which feeds drill spindles to work progressively as drum revolves. Facilities are provided, when desired, for passing pieces on to a countersinking attachment as they leave the drilling operation, where two opposed spindles operate to countersink both ends of the holes drilled.

Very high production is obtained on such a machine.

THIS NEW WAY
TO INCREASE PRODUCTION
WILL SAVE TIME AND MONEY

Don't discard dull taps. Resharpen chamfer easily! Quickly!

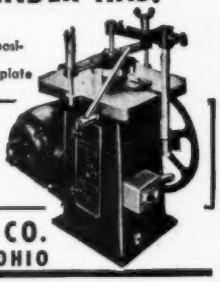


Inexperienced workers can use the NEW READING TAP GRINDER on tool and cutter grinders-surface grinders - even bench lathes.

Order at Once!

READING TAP GRINDER HAS:

- Built-in chamfer protractor.
- Simple shifter for 2-3-4- flute taps.
- Variable relief thru adjustment screw—positive lock.
- Easy-to-follow chamfer diagram on index plate
- Capacity to ¾" hand tap.



ALSO MANUFACTURERS OF
READING BROACH KEYSEATER
The Reading Bench Machine does not require bushings or guides. No other machine like it. Very fast-capacity from 1/8 to 5/8 cutter. Low first cost—prompt delivery.

READING MACHINE CO.
READING (CINCINNATI) OHIO



much less stock.

To put it in other words, you can turn your stock to much closer limits, if you use such a centering machine on the parts before the grinding. The same type of centering machine will also center cold rolled stock with close accuracy.

Where you have a cylindrical part of very small diameter, which you want to chuck for further operations in the lathe, and the job has to do with tooling or some other phase of work where precise concentricity is required, it is important that the chucking itself be precise.

Possibly one of the best methods of chucking such small parts for precision work in a small lathe, is to have a draw-in collet attachment of the hand-wheel type.

There are firms which make a specialty of providing this type of attachment for many makes of bench lathes. One such device that is standard fits three different bench lathes on the market all of which are quite widely used.

If you make a standard cylindrical part to very close limits, whether it be shaft, a spindle, or some other item, it will likely pay you to have an external cylindrical or so-called ring gage. It can be slipped directly over the part to be gaged, and should be an easy push fit when the part has been correctly sized. Such gages cannot vary except under temperature extremes.

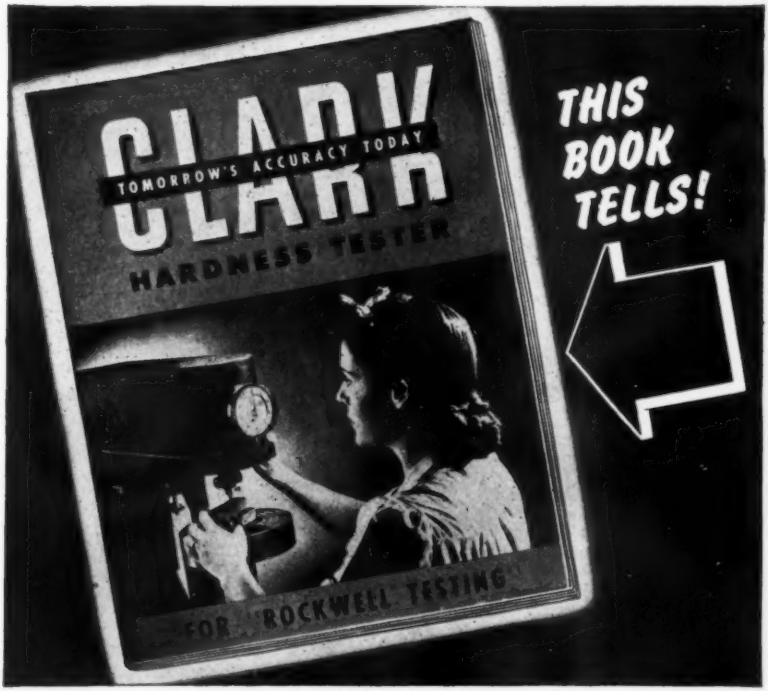
CYLINDRICAL PARTS

In many cases, where a reasonable amount of precision on straight cylindrical parts is all that is needed, turning and centerless grinding can take care of the job.

But where a cylindrical part is simply the basis of a more involved product, other factors enter. In grinding parts produced in turret lathes or on automatics, on grinders where work is mounted between centers, you will find that intermediate use of precision type centering machines allow you to do the grinding on

DO YOU KNOW THE TRUTH

About Hardness Testing?



CLARK
TOMORROW'S ACCURACY TODAY
HARDNESS TESTER

The new Clark catalog is more than a catalog.

It is a 20-page reference manual on the history, theory, practice, and equipment for modern, scientific hardness testing. Printed in two colors, size 8½"x11", it is available without charge to manufacturing executives. Just drop a line on your letterhead to Department BB, CLARK INSTRUMENT INC., 10200 Ford Road, Dearborn, Michigan.

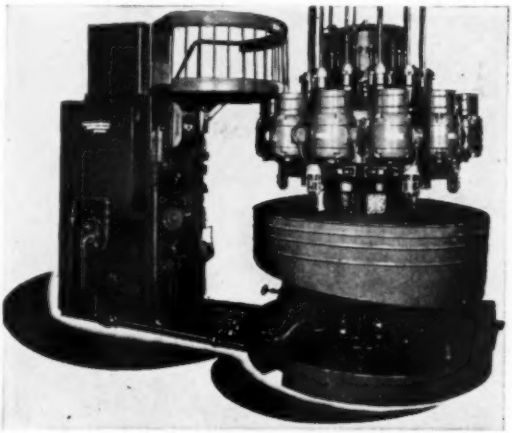
New Tools and Equipment

EAGLESFIELD VERTICAL 12-SPINDLE AUTOMATIC SCREW MACHINE

A NEW 12-spindle vertical type automatic bar feed and chucking screw machine, hydraulically operated and known as the Eaglesfield Verti-Matic, is announced by the Machine Tools Division of The C. I. Togstad Co., Kokomo, Ind.

Designed primarily for fast and accurate production of parts from round, square or hexagon bar stock, the Verti-Matic may also be used for the machining of drawn steel parts of different shapes. Many adaptations are also possible. For instance:—the machine can be used, without changing, for chucking operations within its capacity, as weight of parts in the long magazine tubes automatically discharges finished pieces.

Among the advantages claimed for the machine are faster production with less man power, simpler and faster set-up because of pre-tool set-up at bench, and 50 per cent less floor space requirement because of the vertical construction.



While the Verti-Matic offers the distinct advantage of providing 12 different operations for completing a part, it also permits employment of duplicate operations to produce more than one piece at the same time. For example, if a part can be made in six stages of the turret, two pieces can be made at the same time by tooling the six in duplicate. If a part can be made in four stages, three parts can be made at one time. And so on to the point where the part can be completed in one position by using the tools on both horizontal and vertical cylinders. Then the turret is held in one position and 12 parts are made at the same time.

The Verti-Matic comprises two units—the machine proper and the control unit. Being vertical in design, there are no long lengths of bar stock to project horizontally. In addition to the saving of floor space, the mechanical contrivances used to feed stock through the horizontal type of machine are eliminated, since feeding is handled entirely by gravity through the hollow spindles from above.

The machine proper consists of three main units:—base and column, lower turret, and upper turret. The base is a large cast iron pan with a supporting column running upward from center. The column serves not only as a support for the rest of the machine, but also as a catch basin for the cutting fluid. The lower turret, which houses the lower spindles with their respective drills, taps or cutting tools, is fastened rigidly to column at a height convenient for operator.



Sheldon BBU-1240 WQ
Precision Lathe

This quality 12 in. ball bearing tool room lathe is built for precision work and will retain its accuracy under long and hard usage. It has extra collet capacity (to 1" round), the finest precision ball or roller bearings obtainable, an improved heavy-duty, double wall apron with power cross feed; full quick change gears and full bowl headstock. Its improved Sheldon 4-speed, V-belt, lever-clutch operated, underneath motor drive is entirely enclosed in the pedestal leg and has anti-friction bearings. It is so designed that spindle belts operate thru a *standard* 1-piece bed. This bed is bridge-braced with heavy cross girts and has hand scraped ways—2 V-ways and 2 flat ways.

If interested in 10", 11" and 12" quality lathes be sure to see the SHELDON.

SHELDON MACHINE CO., INC.

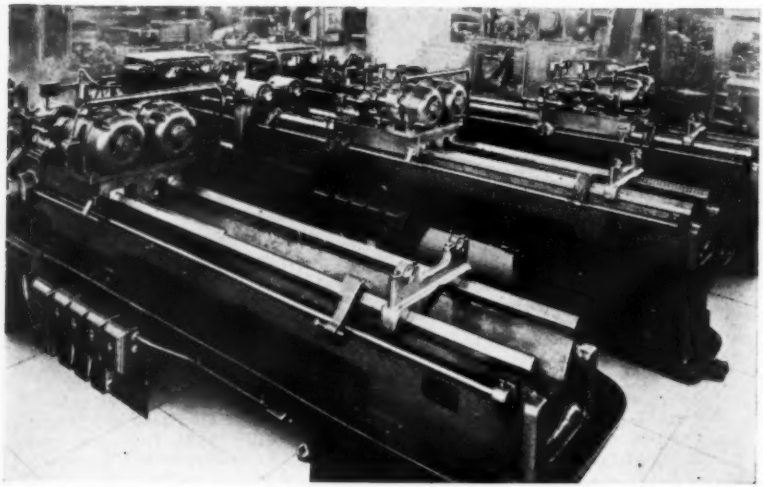
4242 N. KNOX AVE. CHICAGO, U. S. A.

This turret also carries the stock locator and the manifold supplying the cutting fluid. The upper turret is also mounted on the column, but is not fixed radially. It is supported on two large Timken bearings, and is allowed to rotate around column at desired intervals. The 12 spindles each revolve on Timken bearings, and each is driven separately by a 2 hp motor mounted on outside diameter of turret. Drive is by V-belts, and motors are mounted on hinged brackets to provide belt adjustments.

Directly above lower turret are the 12 horizontal cutting cylinders, with the various tools required for their respective operations. These cylinders are fastened rigidly to column in a radial direction and in line with each spindle position. Speed at which the cylinders travel is accurately regulated by means of metering valves. Not only can the cutting speed be perfectly adjusted, but a cushioning effect is accomplished by use of hydraulic feed.

Operation is entirely by hydraulic timing, which is adjusted by the simple setting of split cams to obtain timing desired. Cam shaft is driven by adjustable V-belt pulley, making it possible to obtain any timing cycle. This timing enables indexing to be done without shock, and three minor adjustments permit any wanted variation in operating cycle. Tool feed speed is adjusted with an all-steel valve for each cylinder, conveniently located under cylinder. A direct connected pump forces cooling oil to large manifolds, providing a large supply of coolant. The coolant volume is great enough to wash chips down the gravity chute in bottom of the oil covers, into chip box, which is easily emptied when filled. As machine is designed for water soluble coolants, there is no destructive heating of tools and work. Catalog V-100 giving complete details on construction and operation is available on request.

MOREY NO. 1½ DUPLEX DEEP HOLE DRILLING MACHINE



A new Model No. 1½ Duplex Deep Hole Drilling Machine has been developed by Morey Machinery Co., Inc., 410 Broome St., New York City, embodying a number of interesting features:

Hydraulic feed to the exact amount required by the work is instantly available.

A single directional lever controls feeds and power traverse in each direction.

The drill holder carriage is provided with automatic control, stopping the motors (A) if drill slips in either of the drill holders and (B) if the cutting lubricant pressure drops.

No. 34 ABRASIVE SURFACE GRINDER

with the

VERTICAL SPINDLE

that works for

VICTORY



On many a production line, the ABRASIVE No. 34 is grinding out small parts that are unusually accurate, smooth and flat. The vertical spindle, and cylinder type wheel, speed output and cut costs in producing such work as small flat dies, washers, punches, spacers, parallels, chasers and raising blocks. Engineered and built to ABRASIVE'S high standards, the No. 34 offers many important features including the one-piece bed casting, as originated by this Company.

Ask your nearest dealer for information concerning this and other ABRASIVE Grinders — or write the factory direct.

ARMY E NAVY

ABRASIVE MACHINE TOOL CO.

Dealers in Principal Cities

EAST PROVIDENCE · · RHODE ISLAND

After June 1, 1943 our New England and Metropolitan New York representative will be RUDEL MACHINERY CO. with offices in New York City, West Hartford, Conn., and Boston, Mass.

Remember
RITCO
for
SCREW MACHINE PRODUCTS

For years wise buyers of screw machine products have entrusted their orders to the Rhode Island Tool Co. for consistently uniform and accurate work in all materials. Our facilities for such work include multiple spindle machines to 2⅝"; single spindle to 1".

Remember RITCO for
SPECIAL BOLTS, NUTS & STUDS
DROP FORGING & DIE SINKING
SCREW MACHINE PRODUCTS
SPRAYED METAL SERVICE
HEAT TREATING • PARKERIZING

Estimates gladly submitted.
Send samples or blueprints.
Catalog on Request.

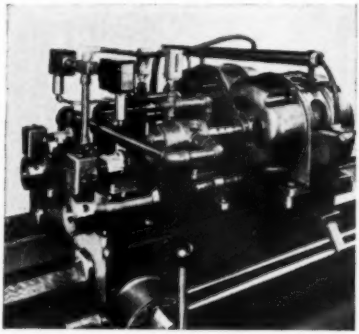
RHODE ISLAND TOOL COMPANY
148 West River St., Providence, Rhode Island
Serving American Industry Since 1834

RITCO

Separate motor driven high duty coolant pumps are provided, each protected by suitable filters.

The sturdy headstock has been greatly simplified.

Exactly the speed required is available, selected through pick-off gears.



A new model No. 4½ Deep Hole Drilling Machine has also been developed. This is mechanically actuated and was designed and built for boring 90 mm anti-aircraft guns.

ALL-PURPOSE SHEAR

Kling rotary shears are said to be an all-purpose, heavy duty machine which, with attachments, performs a wide range of functions. One unit cuts straight lines, openings, circles, odd shapes, strips, flanges, bevels, joggles and offsets. With this unit, it is possible, says the manufacturer, to shear any shape desired, including parts with very small radii, right or left hand. Attachments are available for all of the functions named.

These shears can also be equipped with rolls for beading, "U"-ing, wiring and forming operations. They cut plate up to one inch thickness in mild steel, and of proportionate thickness in other metals. Where space is limited, it is conserved by these shears, which are said to function without need of starting cuts from edge of plate.

Friction clutches of the Pullmore double end oil type permit shearing speeds to be changed simply by shifting clutch from one position to another. Clutch is set at factory and seldom needs adjustment.

Cutters are made of oil-hardening tool steel, heat-treated for maximum service

WOMEN too, can do fast accurate TAPPING... with



Ettco-Emrick TAPPING ATTACHMENTS



And here are the reasons why:

1—These Tappers are designed for **high-speed** operation and are constructed accordingly.

2—The **sensitivity** needed in tapping, particularly with the smaller size taps, is provided in the exclusive design of the friction clutch which is as sensitive as a hair-trigger.

3—The tap **idles in the cutting direction** which prevents chamfering the hole and doubles cutting edge life.

4—Reverse is automatic.

Attachments can be used on any drill press and QUILL CLAMPS are available to assure absolute rigidity.

For years Ettco-Emrick Tapping Attachments by the thousands have been used in shops throughout the country with complete satisfaction in both performance and length of service. They're time, tap and money savers.

BULLETIN No. 2 GIVES FULL DETAILS

Write for your copy today.

ETTCO TOOL CO.

596 Johnson Ave., Brooklyn, N. Y.

Detroit • Chicago

ETTCO-EMRICK TAP CHUCKS

Operator can see chuck jaws and tap head, assuring proper insertion of the tap every time. 5 sizes for No. 0 to 1" taps. Details in Bulletin No. 6. Collet type chucks are available for No. 6 to 3/8" taps.

The Famous Ettco-Emrick

DRILL CHUCKS • TAP HOLDING CHUCKS
TAPPING ATTACHMENTS • TAPPING MACHINES
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS
Unexcelled for Design, Materials and Workmanship

Faster metal sawing!



Check these features -

Metal sawing is no longer a problem for plant production men who rely on the Johnson Saw; the speed accuracy and efficiency of this machine make delivery schedules easier to meet. Quick set-ups; unlimited adaptability and flexibility for almost all cutting jobs. 3-point base compensates for uneven flooring. PROMPT DELIVERIES!

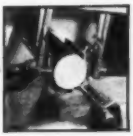
Write today for descriptive folder to
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CUT PIPING!



CUT GIRDERS!



CUT SOLIDS!

JOHNSON METAL CUT-OFF BAND SAW

JOHNSON MANUFACTURING CORP., Albion, Mich.

Important New Features!

on this new Low-cost Delta

CHIP-BREAKER GRINDER

In addition to the best features of standard grinder design—this new Delta machine incorporates many, new exclusive improvements not found in grinders costing many times as much. It is a big, heavy, accurate machine, designed for grinding the chip-breaker groove in carbide-tipped tools—also for grinding form tools, thread chasers and other units requiring accurate grinding.

Can Also Be Used as Surface Grinder

By simply removing the universal vise, this grinder can be used as a regular surface grinder—which greatly increases its usefulness to both large and small shops.



Some of the "Highlights" of this Big, Solid, Accurate Machine

Production men who see this grinder for the first time are invariably astonished at its many features and its low cost. Some of the outstanding points are:

New "UNIVISE"
—for grinding, drilling and light milling. It has four distinct planes of adjustment which means that any angle can be easily and speedily obtained. By simply making a record of settings of each scale for duplicate grinding, the vise can be quickly reset to exact original angle.

Improved, Well-Designed Spindle
—the "heart" of any Surface Grinder—made extra long with bearing at either end, widely spaced.

Special Wheel Mounting System
—utilizes two-piece adapter so that either wheel, or wheel and adapter, can be removed.

Improved Table
—smooth operating, with conveniently located control handles—has long ways so that table rides solidly.

Send Coupon For Full Details!

ARMY E NAVY

The Army-Navy "E"
—awarded for excellence in the production of machine tools vitally needed in the war effort.

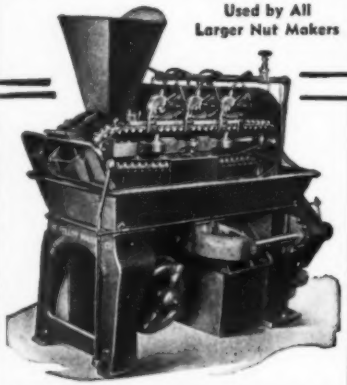
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The Delta Manufacturing Company
694-F E. Vienna Ave., Milwaukee, Wis.

Gentlemen: Please send me your new catalog giving full details and prices on the Delta Chip-Breaker Grinder and your full line of low-cost machine tools.

Name .....
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SPECIAL PURPOSE
NUT SLOTTER
Used by All Larger Nut Makers



HIGHEST OBTAINABLE
– PRODUCTION –

- 6 CUTTERS MILLING CONSTANTLY . . .
- 2 CONVEYORS RUNNING CONTINUOUSLY . . .
- AUTOMATIC INDEXING . . .
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- AS HIGH AS 3000 SLOTTED NUTS PER HOUR . . . ALL SIZES FROM ⅜ TO 15/16 HEXAGON ACROSS FLATS

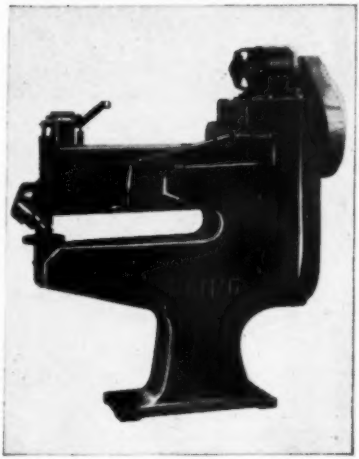
Slots Two Sizes at Once





All Aircraft Sizes and All Materials

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life. A gib key provides for any take-up resulting from natural wear on cutter heads. All bevel gears and pinions as well as the cutter shafts, are made of wear resistant alloy steel. Six size models are available with maximum shearing capacities ranging from ⅛ to 1" plate. They are adapted to the needs of all plants where sheet metal or plate is sheared or formed; including boiler factories, shipyards, navy yards, automobile manufacturers, aircraft makers, structural shops, sheet metal shops, steel mills and steel warehouses.

Kling Bros. Engineering Works, 1300 N. Kostner Ave., Chicago, are the makers.

ELECTRIC TOOL CATALOG

A new catalog, No. 900, just published by Chicago Pneumatic Tool Co., 6 E. 44th St., New York, should fill an important place in modern plant and purchasing department offices. It lists and describes every portable electric tool made by the firm, giving full specifications and details on accessories. Included are drills, reamers, screw drivers, nut runners, stud setters, tappers, sanders, buffers, polishers, etc., for practically all types of applications.

The book comprises 70 pages, and in addition to many on-the-job illustrations, supplies conveniently at hand comprehensive data of use to production schedulers and plant executives.

GREAT LAKES
Broach & Gage Company

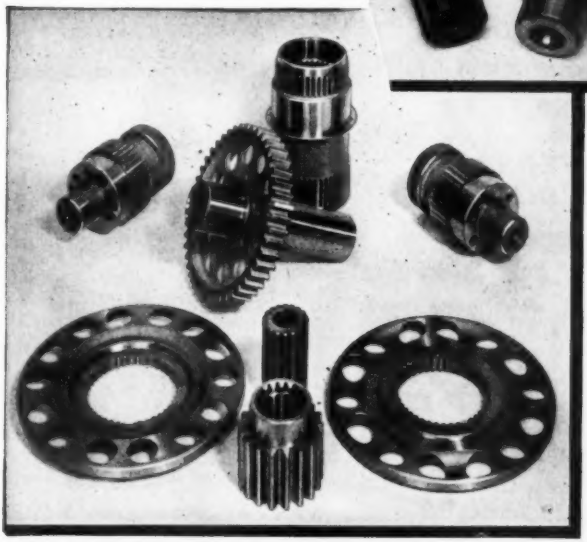
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BROACHES...
All types
and sizes.

GAGES...
Serration, Straight
and Involute Spline,
Male or Female.

MASTER GEARS and
MASTER INDEX PLATES.





You can also increase Production Speed with Broaches.

GL B&G Co.

INTERNAL GRINDER FOR HAND OR HYDRAULIC OPERATION



A new contribution to the art of grinding has been announced recently by Savway Industries, 4871 East Eight Mile Road, Detroit, Mich.

It is a new internal grinder, designed to meet varied grinding conditions. Its special feature is that it provides for hand or hydraulic table operation. Each of these is wholly independent of the other; tho it is possible to use both hand and hydraulic feed in combination—on the same job, and in the same setting.

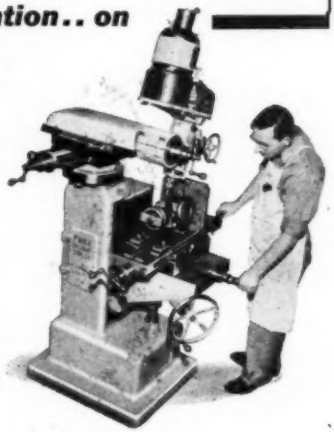
Hand operation is said to give the worker complete control for setting up; and to be preferable frequently for short holes, blind holes, and facing, while with the hydraulic system, high table speeds by power are obtainable for long holes.

These table speeds range up to 55 feet per minute.

ONE WORK SET-UP ***Handles Every Angle or Compound Angle Operation.. on***

FRAY 7-B

UNIVERSAL MILLING MACHINES

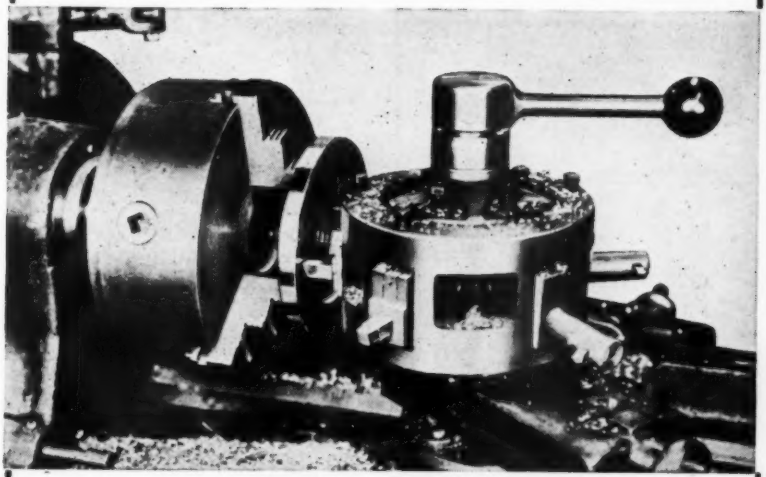


- You can handle every milling, drilling, boring, grinding job—at any angle or compound angle—in horizontal and vertical planes—without changing the work set-up.
- On a Fray "All Angle" Milling Machine you have 10 inches of cross travel above the table. The Turret Head is 11½" in diameter, machine calibrated.
- The Head can be rotated a full 360° in both planes, for any angle or compound angle. The Ram has 10" of in-and-out movement.

FRAY MACHINE TOOL CO.

501 W. Windsor Road Glendale, California

A Real War Production "Speeder-Upper"



LATHE TURRET

5-Station Oscillating Tool Block
— Four Individual Sizes —

Use your present Engine Lathe equipment — give it Turret Lathe versatility and productiveness by installing this modern 5-Station Automatic Oscillating attachment on your compound.

An eighth turn of the handle and a lift to a 45-degree position releases the turret head so that it may be turned to any one of the ten positions allowed by the indexing. Indexing is accomplished accurately with a crown clutch arrangement, eliminating any manual lifting of a pin and assuring sustained accuracy. Tool bits may be rotated as well as tilted in any position, allowing for more precise settings and top cutting efficiency.

This is a rugged, money-saving, continuous-duty lathe accessory that becomes an integral part of the lathe. It must not be compared with makeshift, light duty, turret attachments.

Let us send you a copy of our new 8-page bulletin giving money-saving tips.

Automatic Machine & Tool Co.

Box 14 **Auburndale, Mass.**

NEW LOW COST
DRILL GRINDER
Anyone can do expert drill grinding with this simple-to-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time and materials that dull bits waste. Grinds bits from 3/16 to 1¼. Write for FREE literature.
T & H MFG. CO.
811 E. 31 St.
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Industry's New Tool . . .
Mead Burring Machine
It is a time, labor and money saver on innumerable jobs in any shop. Sharpens tools, cutters, etc., of many kinds. Prompt shipment.
Mead Specialties Co.
15 S. MARKET ST. DEPT. 63-Y CHICAGO, ILL.

Minimum table stroke is ⅜"; maximum 24".

Base measures 70¼x48½". Floor space required is 105x48½". Approximate weight of the machine is 5300 lbs.

A folder giving further details is available.

Rototrol Drive Control Booklet

For use where wide speed range or close regulation is required, the Rototrol, a versatile d-c drive control, is described in a new Westinghouse booklet.

The new 14-page booklet "A Challenge to Designers of Drive Control" describes how Rototrol increases the speed range; keeps the speed of a direct-current motor constant regardless of load variations; makes accurate or very close speed regulation possible; gives uniform acceleration and deceleration; and maintains constant horsepower and uniform tension.

Charts, diagrams and photographs explain how the Rototrol regulates by transposing mechanical and electrical quantities. Typical applications are described and illustrated. First used in the automatic welding head, the Rototrol is now used for a wide range of applications: high-speed elevator, variable voltage planer drives, paper mill drives, mine hoists, steel mill skip hoists, and electric shovels and draglines.

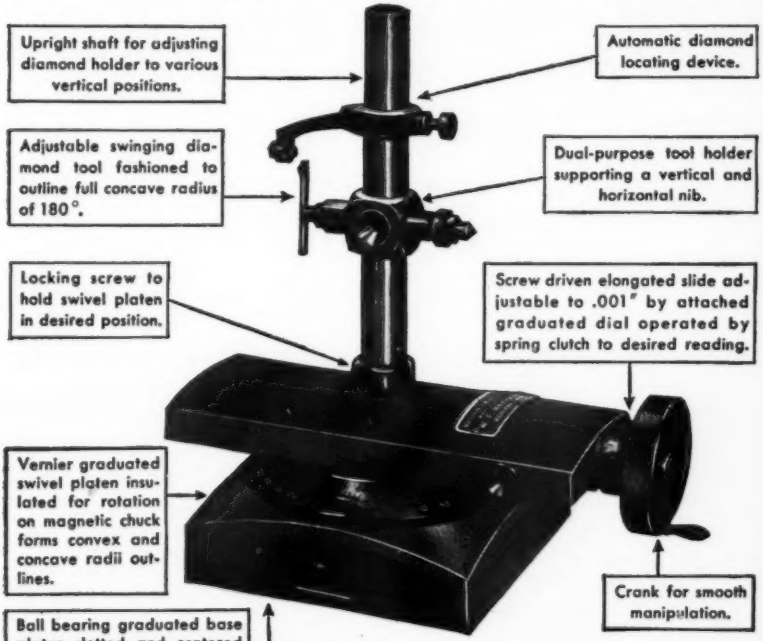
A copy of B-3123 may be obtained from Department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Micro Supreme IMPROVED LAY-OUT DYE
for SHARPLY DEFINED SCRIBED LINES
LOW IN PRICE
for TOOL, DIE, PATTERN, OR TEMPLATE LAYOUT ON METAL
One Gallon $4.25
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A BIG TIME SAVER *In Wheel Forming*

Difficult Radial and Angular Outlines Quickly Formed

The Meyers "Dia-Brasive" Radius-Angle Former saves much time by eliminating the lost motion imposed by the "trial and error" method of wheel forming. With this precision tool difficult radial and angular outlines are quickly and accurately formed. Easily installed on various machines. Vertical and straight diamond dresser nibs are furnished as standard equipment. Write for literature.



MEYERS "DIA-BRASIVE" DIAMOND TOOLS

We also manufacture a complete line of diamond dressing tools — both hand and holder types; also special holders, adapters and fixtures.

Aggressive manufacturers' representatives wanted in East, West and South.

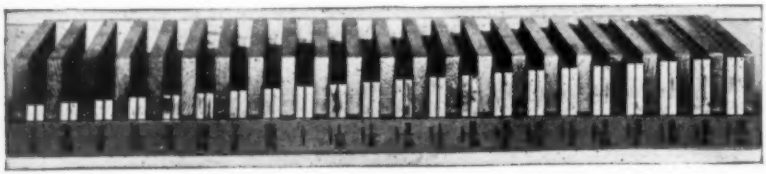


W. F. MEYERS CO., 1012 - 14th St., BEDFORD, IND.

ANTON PARALLELS IN MATCHED SETS

An interesting line of Anton hardened and ground parallels is offered by Eastern Machine & Tool Co., 170 Broadway, New York, N. Y.

The complete set comprises 22 pairs, unground sides of each bar, to speed selection of the right bar for the job. All parallels are tested for size and straightness, then aged and retested before shipping.



from ½ to 1-13/16" in height, in steps of 1/16", in a handy case as shown. They are ¼" in width and 6" long and are claimed accurate within .0001" in parallelism and straightness on ground sides. Depth of hardness is said to be about .040" (Rockwell C-64 plus or minus 4).

The assortment of sizes was planned to take care of every-day machine shop needs. Sizes are plainly stamped on both

DIAMOND DUST BULLETIN

J. K. Smit & Sons, Inc., 157 Chambers St., New York City offers a new 4-page illustrated folder on Diamond Dust. It is a timely and interesting presentation on what to look for in diamond dust for industrial purposes and is of interest to purchasing agents, shop executives, superintendents and foremen. In writing please use your company letterhead.

• SMALL GAUGE DRILLS ARE ALSO CRITICAL TOOLS •
ACCURATE GRINDING PREVENTS WASTE—PROLONGS USEFUL LIFE



BLACK DIAMOND
PRECISION DRILL GRINDERS

Motor driven, these highly efficient Black Diamond Grinders are doing yeoman service in hundreds of large and small war production plants throughout the nation.

They not only produce quantities of perfectly sharpened small gauge and fractional drills, with lips of uniform length, correct angle and proper clearance for true, accurate drilling—but release skilled mechanics for more important work.

The Web thinner, an important attachment, cares for the proper grinding of Notched, Colton or so-called Crankshaft points . . . and the diamond dresser keeps the grinding wheel always sharp.

Write for Bulletin 122

BLACK DIAMOND SAW & MACHINE WORKS, INC.
NATICK, MASS.

MARSCHKE BUFFERS

at CURTISS-WRIGHT

• Airplane propeller blades are polished with light MARSCHKE Swing Frame Buffers at the Caldwell, N. J., plant of Curtiss-Wright.

These highly maneuverable machines are as efficient for buffing awkwardly shaped work pieces or flat metal surfaces as are Marschke Swing Grinders for cleaning steel slabs and castings. If your job is similar, a Marschke will definitely speed and improve your work.



Marschke Swing Frame and Pedestal Buffers are made in sizes from 1 to 15 HP, single and selective speeds. Write for Buffer Bulletin No. 47.

"THE MARSCHKE LINE"

manufactured and sold by the

VONNEGUT MOULDER CORP.

1805 MADISON AVENUE
INDIANAPOLIS, INDIANA

★ CONTOUR CUTTING *with* ATLANTIC Band Saw Blades

speeds production



Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.



Special Containers for narrow width coils, 100' length. Convenient to use.

ATLANTIC SAW MFG. CO.

Metal Cutting Band Saws Exclusively

153 Brewery St., New Haven, Conn.

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ALPHIL
SPOT WELDERS
More Production-Lower Cost
Used in leading Aircraft Industries and many other Government plants.
Welders built for both foot and air operation. Rocker Arm, Press Type, Lower Adjustable Arm, Straight Up and Down. Also Swivel Type. Problems?—Consult Us. For literature and prices write to Dept. B3
Alphil Spot Welding Co.
431 W. Broadway, New York, N.Y.



Torque Wrench
MORE ACCURACY
LIFE
SPEED
3 DIALS
NO FRICTION
ADJUSTMENTS
MOVING PARTS
FRAGILE MECHANISMS
Constructed for exacting laboratory work or continuous production use.
A practical wrench correctly engineered.
PERMANENT ACCURACY.
A capacity and size to fit your combination capacity needed.
PIONEER MANUFACTURERS OF ACCURATE MEASURING WRENCHES
PA STURTEVANT CO
ADDISON QUALITY ILLINOIS

WELDING ROD PROCESSING

Officials of foreign purchasing commissions, welding engineers and large users of welding supplies are invited to an unusual show to be staged at Cleveland, Ohio by Moslo Machinery Co. some time in June. For the first time on record, a welding rod processing plant, complete in every detail from cutting machine to packaging, will be demonstrated in action under one roof.

The plant is one of several sold by Moslo to a large foreign power, and Ernest P. Moslo, President has announced his intention to make time available to all qualified authorities who are interested in the processing of welding rods.

Interesting feature of the show, from the viewpoint of those not completely familiar with actual rod processing, is the amount of machinery necessary to accomplish the seemingly simple job of coating rods with flux and brushing a little from the ends, where electrical contacts must be made.

The processing plant starts with a wire straightening and cutting machine. Then the continuous production line begins with a substantial automatic machine for lining up and feeding rods at high speed to an extrusion press where the special flux is forced at tremendous pressure through a steel die to coat the rods completely. The coated rods are conveyed to a brushing machine which performs a simple but important operation of brushing a clean contact area on one end of each rod. From there the coated rods ride another conveyor into a long drying oven in which the flux is baked on, traveling several hundred feet through several elevations of heat channels.

Emerging from delivery end of the oven, the rods are conveyed to an inspection and weighing table. The final stage is automatic packaging. Several additional units are included in the com-

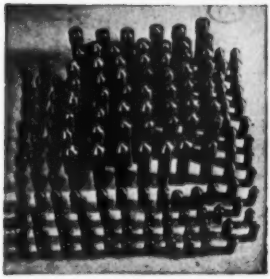
ARCTOOL LATHE CENTERS
PRECISION GROUND
with HIGH SPEED TIPS
Deep Anchorage and large surface area assure accuracy and long life.
Standard Sizes and Prices



A Machine Shop "MUST"
THREAD MEASURING WIRES
in kit form—for determining pitch diameter of thread—precision of .0001
ARC PRECISION TOOL CO. 173 Lafayette Street New York City



DESSAU *Diamond Tools*



DIAMOND TOOLS USED ON CINCINNATI, LANDIS, NORTON, EX-CELL-O GRINDERS.

For over 100 years, Dessau has meant the finest in diamond tool products! Many of the largest and best known manufacturing concerns in the United States specify our diamond tools. Quality, confidence, and service is your assurance of the finest in precision tools. May we answer your diamond tool problems.



MAURICE S. DESSAU CO.

Industrial Diamond Importers • *Diamond Tool Manufacturers*

535 FIFTH AVE. • Telephone, VAnderbilt 6-3422 • NEW YORK, N. Y.

"Dessau Diamonds True the Wheels of Industry"

plete processing plant, such as a machine for mixing flux and a press for forming the "slugs" of flux which provide exactly the right charge for the extrusion press to coat each rod.

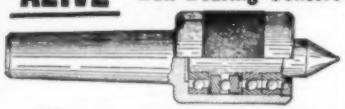
Altogether, an assembly approximately 100 feet long is required to process welding rod properly, and at the speed required to meet present day demands of industries that are employing welding in manufacture and maintenance on a tremendously increasing scale.

Ernest P. Moslo, president of the company, announces that owing to the nature of the operations, which limit the number of persons who can be shown the performance at any one time, inspection is being arranged by appointment. The plant will be in full operation, actually processing wire.

Catalogs Aircraft Tools

Dedicated to today's production problems, new catalog No. 4, Products Engineering Co., 700 E. Florence Ave., Los Angeles, parades its line in interesting and instructive detail. A goodly section of the book is given to the firm's PEC Toggle Clamps, said to cover every modernday production need in either stock or made-to-order models, and embodying exclusive features of availability for small run or production work. Large actual-use plates and blueprint details illustrate the various types of clamps, as well as drill guide pressure feet, drill jig bushings, inspection and locating pins, scribe line duplicators, dimpling sets, flush and standard rivet sets, c-clamps, speed drivers, duplicating punches, etc.

"ALIVE" Ball Bearing Centers



"They turn with the work"

Write TODAY – and let us tell you more about them.

MODERN MACHINE COMPANY
323 Berry St., Brooklyn, N. Y.

MOREY *Designed and Built FOR Precision PLUS Production*

VERTICAL SHAPERS 8"–12"–14" STROKES

Four cutting Speeds . . . infinite feed variations quickly selected . . . Directional control for all movements . . . Rapid power movements in all directions . . . Brake for Ram automatically applied . . . OPERATOR CONTROLS MACHINE WITHOUT MOVING FROM HIS WORKING POSITION . . . Timken Bearings for Bull Gear, Shaft and Rotary Table . . .

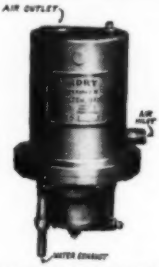
ACCURATE, POWERFUL, FAST, FINGERTIP CONTROL



Ask for Circular No. 73EA

MOREY MACHINERY CO., INC
410 Broome Street New York, N. Y.

WATER removed from AIRLINES AUTOMATICALLY WITH THE MURPHY SEPARATOR



Sizes ½" to 4" Pipe

Literature and Prices on request.

RESULTS — — — — GUARANTEED
NO ABSORBENTS — NO CHEMICALS

JAS. A. MURPHY & CO.
HAMILTON, OHIO

New!

THREE TOOLS IN ONE

A DOUBLE-SWIVEL



PLUS 3 EXCLUSIVE FEATURES

Pat. Pend.

1—Instantaneous FREE-WHEELING without DISMANTLING the Head.
2—Change from 40 to 1 ratio to Quick-Indexing, i. e. (Precision to Production) in 30 seconds.
3—Life-time NO-BACK-LASH adjustment of worm and worm-gear.

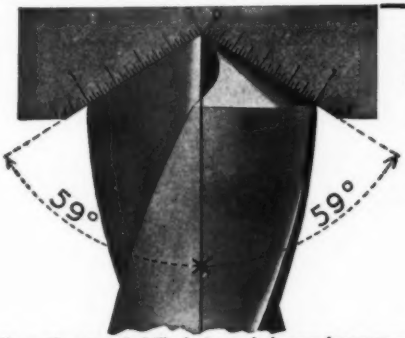
REPUBLIC converts regular grinder or milling machine into Universal.
Now in use by Army, Navy, Boards of Education, Aircraft plants and other precision tool and machine shops. Needed in every Tool Room!

WRITE NOW FOR DESCRIPTIVE FOLDER AND ATTRACTIVE PRICE AND DELIVERY

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REPUBLIC TOOL MANUFACTURING CO.

7722 Maie Ave. - LOS ANGELES, CALIF.



TROUBLE GETTING DRILLS?
Have that trouble less often!



Correctly ground drills last much longer because—
(1) They drill more holes per grind
(2) Less of drill ground away than by free hand.
(3) Each lip cuts same amount.
(4) Less chance of breakage.
(5) Drills will be ground when necessary if a HISEY Drill Grinder is available.

HISEY Drill Grinders (Bench and Pedestal) types made in 4 sizes for grinding drills from No. 60 to 2½ inches, all kinds.

EXPERIENCE NOT REQUIRED

Hisey THE HISEY-WOLF MACHINE CO CINCINNATI, OHIO

WRITE FOR CATALOG 60HH



FOR Your 1-1/2"-8 THREAD SPINDLE

Lathes

FULL SPINDLE CAPACITY
NO STOPPING OF MACHINE
FITS LATHE, MILL AND DRILL PRESS
NEEDS NO KEYS OR WRENCHES
UNSURPASSED FOR PRODUCTION
NO PUSH OR DRAW BAR ATTACHMENTS

See your distributor or write for literature.

Allison

TOOL & ENGINEERING COMPANY

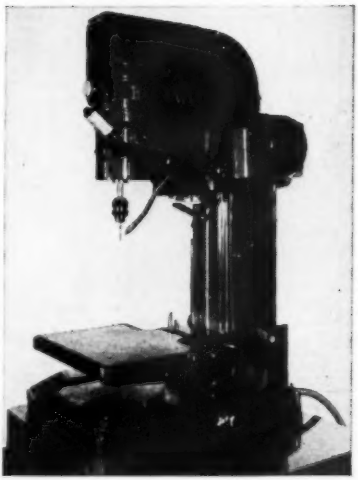
4031 WHITTIER BLVD. LOS ANGELES, CAL.

NO. 0 BENCH MODEL BAKEWELL

At the recent A.S.T.E. show, the Bakewell Mfg., Co., 2023 Santa Fe Ave., Los Angeles, introduced its new No. 0 Bench Model Tapping Machine. It is patterned after the other Bakewell models, in that it has the supersensitive clutch to guard against tap breakage, a depth control that regulates the tapping stroke to within 1/10 of a revolution, and the well known Bakewell lead screw and electrically operated guide finger control.

With a tapping or threading capacity of from No. 0-80 to 8/32" in steels and with spindle speeds of 400, 800 and 1750 rpm, the No. 0 offers a production tool that should quickly find a receptive market wherever precision tapping of small holes is required.

It is claimed by the manufacturers that this new tapping machine will produce Class 3, 4 or 5 gage fit threads with one pass of the tap in any material.

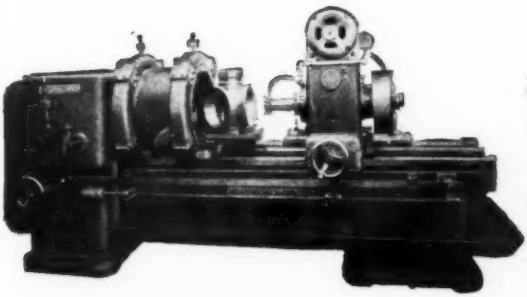


CUT-OFF BAND SAW

Many types of metal fabricating plants can take interest in a bulletin describing the metal cut-off band saw. Made by Johnson Mfg. Corp., 5000-04 Chrysler Bldg., New York City.

MOREY DESIGNED AND BUILT *For* PRECISION *Plus* PRODUCTION

MOREY-SHIELDS THREAD MILLING MACHINE



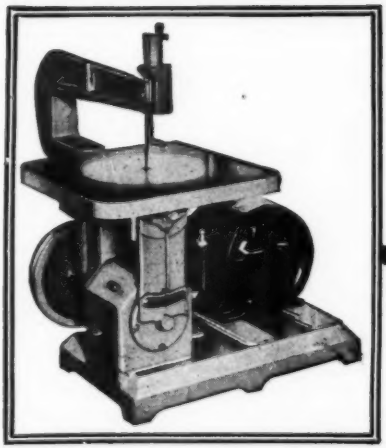
Maximum diameter	Distance between centers
12"	60"
12"	90"
12"	120"

Longer beds to order

• Hole through spindle 4 1/16" . . . Headstock—a complete self-contained unit . . . Simplicity in selecting varying cutter speeds and feeds . . . Extra heavy and rigid bed section . . . Motor driven cutter head, fully universal . . . Control—convenient to operator . . . Equally efficient for external or internal thread milling, with either single cutter or a hob.

Ask for Circular No. 737

MOREY MACHINERY CO., INC
410 Broome Street New York, N. Y.



IMMEDIATE ★ DELIVERY! ★ ATLAS DIE FILING MACHINES

Can be used for all kinds of die making. The overarm is constructed so that the file and saw attachments may be interchanged with little effort. The holddown fingers are attached directly to the overarm. Working surface of the table, which tilts two directions, is entirely clear. An improved type chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast.

Price Complete With Motor
$125.00
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The Standard of QUALITY

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest *quality* and *service* at *attractive prices.*

Write today for prices. *Few Territories Open.*

QUALITY TOOL WORKS
Market St., Waukegan, Illinois



GRAND QUIKCET

SETTING THE PACE ON EVERY PRODUCTION FRONT

Saving 90% of clamping time—new designs for high speed production work, one hand operation. Non-creep replaceable grips, proof-tested alloy steel construction of forged clamp capacity. Screws, rods and handles *copper plated* against welding spatter.

A complete line of modern time-saving clamps—both malleable iron and alloy steel: Dual Grip "C" Clamps; Heavy Duty Speed Clamps: Standard DeLux; Standard Alloy-Steel; and Quick Lockcet, the last word in modern clamp design.

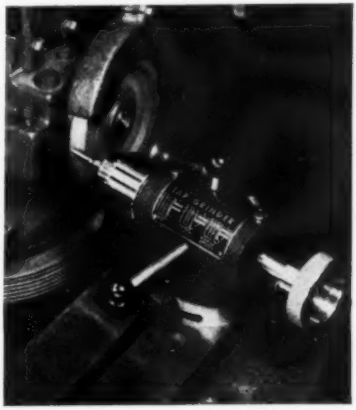
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GRAND SPECIALTIES CO.
3132 W. Grand Ave. Chicago, Ill.

THE READING TAP GRINDER

A contribution to tool conservation is offered by Reading Machine Co., Reading (Cincinnati) Ohio, in the form of a compact and ingenious Tap Grinder.



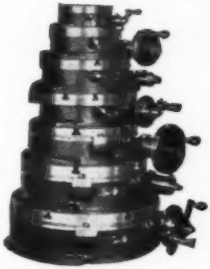
Readily portable, the Grinder may be used on almost any type of tool and cutter grinder, on the magnetic chuck of a surface grinder or even with a bench lathe. With it, tap chamfers may be sharpened easily and quickly, and the makers say it is being used successfully even by inexperienced workers.

The new features emphasized by the makers include:—a built-in chamfer protractor; a simple shifter for 2-3-4 flute taps; variable relief is provided thru an adjustment screw, affording a positive lock; an easy-to-follow chamfer diagram is embodied on index plate; capacity is up to a ¾" hand tap.

This Company also sponsors the Reading Broach Keyseater.

GET BIG PRODUCTION FROM UNSKILLED WORKERS!
Every dollar invested in
BOICE-CRANE
Safety-Engineered, Precision-Built, Shop-Tested
POWER TOOLS
does the work of two spent on oversize machines
You can get QUICK DELIVERY from Boice-Crane
BOICE-CRANE COMPANY
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SPINDLE SHAPERS • SPINDLE SANDERS

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Sizes 9", 12", 15" and 18".
Ask your dealer or write us for eight page catalog.

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JOHN'S DRILL JIGS FOR TAPPING MACHINES

These jigs are now provided with universal jaws which permit quick set-up for end drilling and tapping.

The reversible V plates accommodate a large range of diameters.

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MADE OF ALLOY STEEL MILLED FROM BAR

SOCKET HEAD CAP SCREWS



SAFETY HOLLOW SET SCREWS

Try Them On Your Next Job!

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NIELSEN Heavy Duty *Live Centers*

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Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

NIELSEN, INC. LAWTON, MICH.



Properaire EXHAUST BLOWER with Special Adapter for Flexible Hose

- Several sizes. Direct and belt drives, handling one or several different jobs at same time. Silent. Powerful. Dependable.
- Versatile unit; mounted any location or position. Draws off cutting oil smoke and cast iron dust direct from tool, grinder dust and welding gases right from source; removes heat, quickly. Hundreds of uses.

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Grand Rapids Die & Tool Co.

Scribner Ave. at Spencer
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SPEED PRODUCTION?



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ABART GEARS

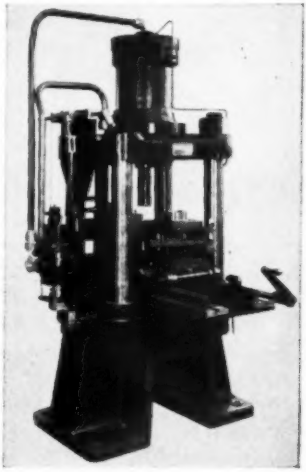
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ABART SPEED REDUCERS: Over 75 types and sizes. Send for complete Speed Reducer Catalog. Wire or write

Abart GEAR AND MACHINE CO.
MANUFACTURERS OF
Speed Reducers & Gears
CHICAGO ILLINOIS

MODEL K PRESSES

A new type of hydraulic press that has been built in 25, 75 and 100 ton sizes—that may be adapted to capacities up to 150 ton, is announced as a "K" Series by Hydraulic Machinery, Inc., Detroit, Mich. Presses are operated by separate motor driven power units. This is the type of press that is manually controlled with a four-way valve—it automatically cuts off when the predetermined pressure or tonnage has been reached—ipm. of closing speed, power speed and opening speed as per specifications.



Frame of the press is made up of heavy castings bolted together by steel tie rods with power cylinder assembled vertically on top and above a base platen 19″ (right to left) x 13¼″ (front to rear) on the 75 and 100 ton presses. The platen is an inch larger in each dimension on the lighter models and an inch or half inch smaller on the larger ones because of 3″ instead of 4″ tie rods on the former, and 4½″ or 5″ tie rods on the heavier types. Maximum Daylight—the length of stroke, diameter of cylinder are built to specification, the bore and stroke varying in ratio to the capacity required. The platen is 27″ from the floor height 75 ton press—overall is 82″ (this dimension varies a few inches one way or another depending upon length of stroke)-



Use Gold Tip and Blue Nose Bits on the Toughest Jobs.

CENTER DRILLS • LATHE MANDRELS • DOVETAILS
KEYWAY CUTTERS • FORM GROUND TOOLS
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Tru-Cut TOOL COMPANY

14236 Birwood, Detroit, Mich.

Specially treated to Rockwell "C" 62-65, and are not brittle.

Actual photo of Tru-Cut Gold Tip Bit. 11/16" cut, .020 Feed, 1020 SAE Steel.

New! **ANGLE TANGENT TO RADIUS DRESSER!**

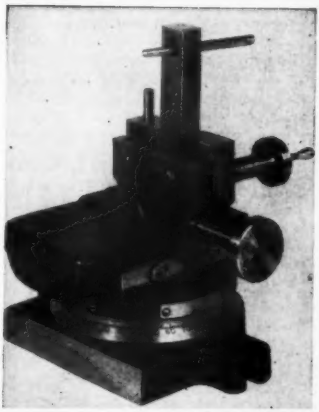
OUTSTANDING VALUE..... $280
F.O.B. Detroit

Fast, precision forming of grinding wheels, from any position or angle, is now possible with the UNITED Model TR Dresser. *Exclusive Feature:* Diamond zero-point is back to same positive position after dressing any ANGLE, TANGENT TO RADII OR RADIUS. Pin in tangent carriage eliminates guess-work.

Some Territories Open for Representatives

Range from .000 to 1.250-inch radii or radius on wheel up to 9-inch diameter.

Immediate Delivery!

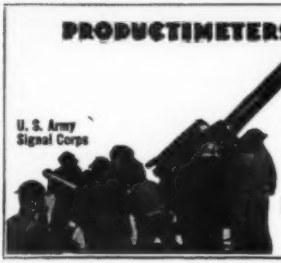


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PRODUCTIMETERS *on the Production Front*



give accurate count on machines producing war materials for the boys on the fighting front. They provide exact figures for control, prevent waste, save vital man-hours.



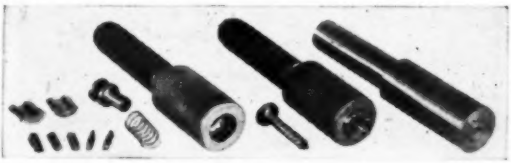
SEND FOR BULLETIN NO. 100

DURANT MANUFACTURING COMPANY

1928 N. Buffum Street
Milwaukee, Wisconsin

180 Eddy Street
Providence, R. I.

NEW METHOD SHAFT-END MARKERS



Designed expressly for marking the ends of shafts and other parts having a center hole, New Method Steel Stamps, Inc., 145 Jos. Campau St., Detroit, is now producing an improved steel type holder (center of illustration) which may be used either with individual type or with logotypes made to specifications of the user. End marking is often desirable, since the end of a shaft or other part is frequently visible when the outside surface is enclosed in a housing or is otherwise less exposed.

When furnished with a knurled shank, the holder is used for hand stamping, and with a turned shank, it may be mounted in a press.

The holder is equipped with a floating locating pin backed up by a light spring for proper register of markings around center. Individual steel type or logotypes (lower left) are made in tapered segments to form the proper radii. Each segment bottoms against a hardened and ground anvil (shown next to type). Segments are held firmly in position against shock loads by set screws and a heat-treated spring sleeve. When the full capacity of holder is not used for type, blank spacers are supplied to fill the mortise. All type characters are made with the Newco bevel, a feature which reduces stamp wear and provides clear markings after long use.

Machinists-Tool & Die Makers-Sheet Metal Men-Pattern Makers-Get

FREE SAMPLE TAMMS BLUE LAYOUT DOPE

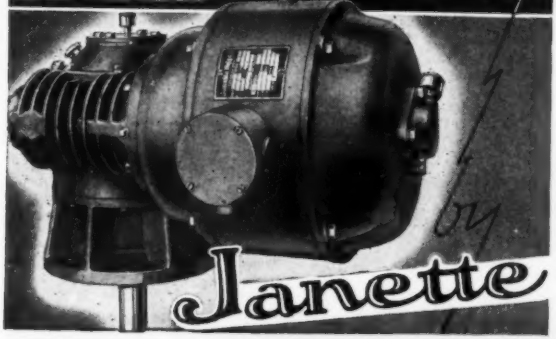
Speeds layout time on brass, aluminum, copper, tin, stainless steel. Won't chip, crack, or flake off. Comes in handy 8 oz. bench type brush-in cans. Also pts., qts., gals., drums. *Send for sample now!*

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SPEED REDUCERS



For SLOW SPEED DRIVES

Speed reducers provide a practical, economical, quiet, efficient, compact, low maintenance cost method for obtaining positive slow speeds from high speed motors.

Janette reducers are built in either motorized or motorless styles, with foot or flange mountings, and can be furnished with Janette ventilated or enclosed motors, designed for standard and special applications.

WRITE TODAY for your copy of our catalog—**100 pages** of complete information on **47 speed reducers,** 1/50 to 10 H.P.

Janette Manufacturing Company
556-558 W. Monroe St. Chicago, Ill.



PRODUCTION THREADING DIE HOLDER

This tool is designed for threading operations on production scale. It is accurate and built for long use with a minimum of wearing parts. Replacements are simple and inexpensive.
The different models specified below can be fitted either into the tailstock of bench or engine lathes. The models with straight shanks are to be used on turret lathes or in tailstock turret attachments. The clutch couplings inside the steel body are solid. As these die holders are furnished with through holes, operators can cut a thread as long as the whole length of the holder and longer.

USE OF OUR DIE HOLDER

Once the holder is put into the tailstock or into the turret, it should be moved as close as possible to the piece which is to be threaded. When the lathe is running turn handle of tailstock and feed it to the required length of thread. When the thread is cut, operator loosens tailstock, reverses lathe and the holder slides out of the thread together with the tailstock. The result is an accurate, clean thread cut within a few seconds.

PRICES FOR DIE HOLDER ONLY:

Model 1 #2 Morse Taper with 3/8" through hole holding 1" O. D. dies	$13.50
Model 2 #3 Morse Taper with 1/2" through hole holding 1" O. D. dies	14.25
Model 3 #2 Morse Taper with 3/8" through hole holding 1 1/2" O. D. dies	15.50
Model 4 #3 Morse Taper with 1/2" through hole holding 1 1/2" O. D. dies	16.25
Model 5 with 5/8" straight shank with 3/8" through hole holding 1" O. D. dies	13.50
Model 6 with 3/4" straight shank with 1/2" through hole holding 1 1/2" O. D. dies	14.25

PROMPT DELIVERIES (F. O. B. L. I. CITY)

Our 1943 *Catalog on small tools and machinery is ready for you. Send for a copy.*

TRAVERS TOOL CO.
5 COURT SQUARE
LONG ISLAND CITY, N. Y.

JONES BACKSTAND IDLER

A new Abrasive Belt Backstand Idler No. 120 has been developed by Jones Engineering Co., Ellwood City, Pa. The new unit, a floor-type model especially designed for crowded grinding and polishing departments, can be connected easily to any regular grinding or polishing lathe.

Unlike conventional backstand idlers, the new Jones Model 120 takes a minimum of floor space, due to a unique vertical arrangement of pulleys. It is emphasized that finishing departments with their grinding lathes set too close to the wall for use with other types of backstands, can equip the lathes with these new Idlers without requiring more than a few extra feet of floor space.

Conversion of regular lathes to belt grinding with the Jones Backstand, using factory-coated abrasive belts and patented Segment-Face contact wheels, is claimed to result in faster, better, easier and more uniform grinding. Factory-coated abrasive belts will increase production, reducing the time required for grinding and polishing operations.



Other features include conveniently located controls at front of machine—handy to operator—adjustable spring belt tightening and positive screw belt aligning. The Backstand will take any belt size up to 6" wide; is designed for belt speeds up to 10,000 surface feet per minute, and is so built that simple dust collecting hoods can be installed. Any worker can set up the Jones Backstand, make belt changes and operate the machine. Complete instructions are given with each unit. A new bulletin (No. 120) has just been released which gives full details. Copies may be obtained by writing direct to Jones Engineering Co., Ellwood City, Pa.

• • •

Buy U. S. War Savings Bonds and Stamps

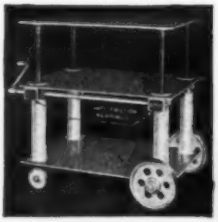
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It Gives Your Work A "Lift"

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Capacity up to 20 tons.



PORTELVATOR

(Portable Elevating Table)

End the everlasting tug-o'-war to move things in your plant. LIFT . . . SUPPORT . . . CARRY finished or in-process parts, tools, stock, shipments in and out . . . with PORTELVATOR.

THE HAMILTON TOOL CO.
Ninth and Hanover Streets,
HAMILTON OHIO

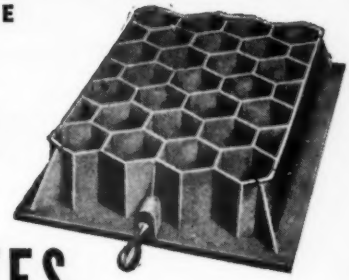
THIS HONEYCOMB BASE

IS THE PATTERN OF

PRECISION

IN MEEHANITE METAL

SURFACE PLATES



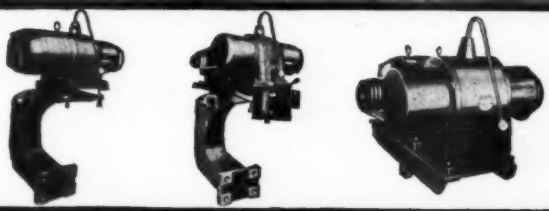
Every factor contributing to accuracy has been incorporated into these surface plates. They are up to one-third heavier than any of the quality surface plates. The honeycomb design base distributes this weight evenly over the entire surface. Hand scraped to extremely close tolerances, of uniform texture, fine close grain, unusual strength and solidarity.

Angle plates and straight edges of Meehanite metal also available. Good deliveries on most sizes.

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LIMA GEARSHIFT DRIVES



Engineered for fast, precision, machine tool and production equipment operations and to increase operator efficiency and accuracy. That is why LIMA Gearshift Drives are playing such an important part in today's production demands. Let us tell you how LIMA Gearshift Drives will increase your production. Write or wire us for address of Lima Engineering Service nearest you.

THE LIMA ELECTRIC MOTOR CO.

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LIMA ELECTRIC MOTORS - MAGNETIC POLISHING LATHES - GEARSHIFT DRIVES - PEDESTAL GRINDERS

K and W

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STANDARD & SPECIAL

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MIRROR REFLECTS MEANING OF WAR SLOGAN

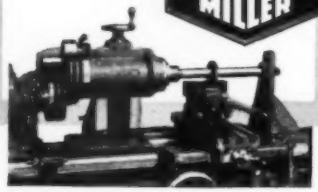


To emphasize the meaning of its slogan -"V" Depends On Me!-Leeds & Northrup Co.,4934 Stenton Ave., Philadelphia, manufacturers of electrical measuring instruments and heat-treating furnaces, displayed mirror posters on the bulletin boards of its plant.

Standing before the red, white and blue poster, one employee after another saw his or her face in the mirror above the slogan "V" Depends On Me! The mirror attracted and the true meaning of the slogan registered.

Makes a Milling Machine out of your lathe in 3 minutes!

GLOBE MILLER



Quickly attached to your lathe, the Globe Miller, with accessories, does all types of precision milling, yet costs only a fraction as much as a heavy milling machine. Increases lathe swing 5 to 10 inches, depending on lathe size, uses all lathe speeds and feeds. Write today for descriptive folder.

GLOBE PRODUCTS MFG. CO.
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600 ROOMS with BATH and RADIO



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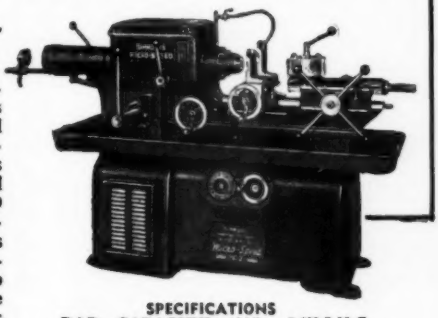
• Ideal Location
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• Radio in Every Room
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HOTEL
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Fifth & Chestnut Streets • Philadelphia

FOR HIGHER PRECISION – FASTER

No. 2 TURRET LATHE

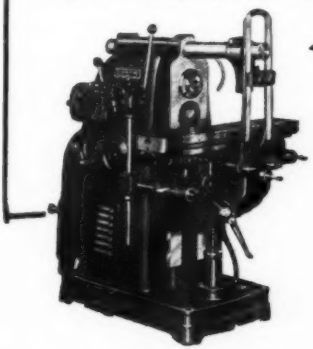
A production standby, the Simmons No. 2 Turret Lathe, handles an infinite number of diversified parts with very little special tooling items in use. It produces close-tolerance work speedily and economically. The MICRO-SPEED Drive offers unlimited speed variations—and while the spindle is in operation—enabling quick selection of the speed best suited to the work and cutting tools. Made in Plain and Back-geared types (the latter illustrated). ***Quick Delivery on high priorities. Write TODAY for details.***



SPECIFICATIONS

BAR CAPACITY—1¼"; SWING OVER BED—14"; SWING OVER CROSS-SLIDE—6"

FOR SMALL PARTS PRODUCTION



No. 1A MILLING MACHINE

Inexperienced operators quickly learn to produce small, high-precision parts on the Simmons 1A—whether long production runs or small-lot work with frequent set-ups. Through MICRO-SPEED, an infinite number of spindle speed changes can be made while the spindle is in motion by means of the Selector Dial. ***Write TODAY!***

SPECIFICATIONS

SPEEDS—56-630 R.P.M.; RANGE OF FEEDS—Horizontal—34", Cross—8", Vertical 18½".

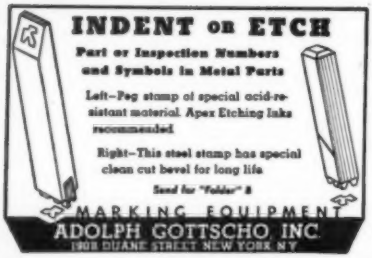
SIMMONS MACHINE TOOL CORPORATION

Main Office: 1725 N. Broadway, Albany, N. Y. *N. Y. Office*: 149 Broadway

SIMMONS



LATHES · TURRET LATHES · MILLERS · PLANERS · 6" BAR BORING MACHINES







C-Master Inspection Tool

Ullman Products Co., 857 Fourth Ave., Brooklyn, N. Y. announce a new line of C-Master inspection aids. The Model K consists of a handle, a mirror and an adjustable angles device which turns the mirror and handle to any combination of angles to inspect inaccessible parts of machinery. Mirror replacements are obtainable at low cost.

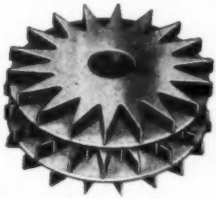


Model M has a magnetic base instead of a handle, which instantly attaches itself to any ferrous part of the machine. The mirror, adjusted to the angle required, shows the part you wish to see and the operator's hands are free.

The mirror has a special water-resistant outdoor back, guaranteed for 5 years against silver deterioration originating from atmospheric or climatic moisture. Mirror is 2-⅛ and 3½" long. Handle of Model K is 10½" long, and the magnetic base of Model M is 1¼x1⅝"x2½". Mirror frame is made of steel with baked-on enamel.



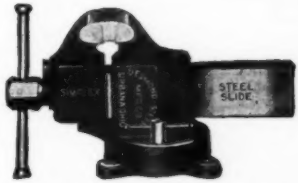
DESMOND
GRINDING WHEEL
DRESSERS and CUTTERS



We can supply you with the proper Dressers and Cutters for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

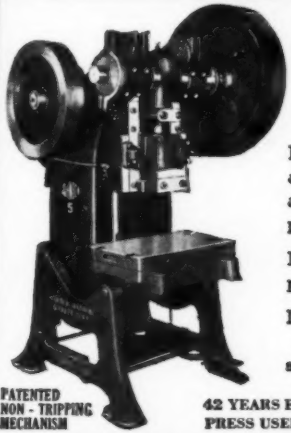
SIMPLEX
Steel Slide
VISES



A full line of Machinists' Filers, Welders, Production and Drill Press and Milling Machine Vises.

Let us send you our vise catalog and name of your nearest dealer.

The DESMOND-STEPHAN MFG. CO., Urbana, Ohio



PATENTED NON-TRIPPING MECHANISM

UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

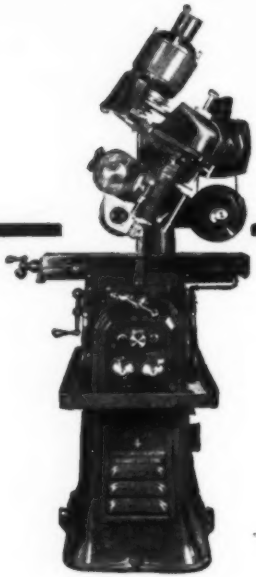
Reinforced construction at points of greatest wear.

If you want the best, send illustrated catalog describing complete line TODAY.

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NO OTHER MILLER HAS ALL THESE FEATURES

1. Hydraulic Feed. **2.** Hand Feed. **3.** Vertical and Angle Spindle. **4.** Horizontal Spindle. **5.** 3 High Spindle Speeds. **6.** 3 Low Spindle Speeds. **7.** Revolving Turret. **8.** 16" Vertical Travel. **9.** 16" Longitudinal Travel. **10.** 8½" Cross Travel.

Entire tolerances held to less than .001

ARMOR UNIVERSAL TURRET MILL

AIRCRAFT MACHINERY CORPORATION
BURBANK, CALIFORNIA

NAZI BOOK PURGE

Elmer Davis, Director of the Office of War Information, recently drew attention to the tenth anniversary of what he characterized "the Blackest day in Germany's intellectual history"—the May 10, 1933, demonstration in which a mob inflamed by Nazi orators burned thousands of the worlds' best books.

The Nazi bonfires that day consumed 25,000 books, including the Bible and the works of Heinrich Heine, Thomas Mann, Albert Einstein, Arthur Schnitzler, Karl Marx, Lion Feuchtwanger, Franz Werfel, Ernst Toller, and Stefan and Arnold Zweig. Also burned were books by such American authors as Ernest Hemingway, Theodore Dreiser, John Des Passos, Jack London and Helen Keller.

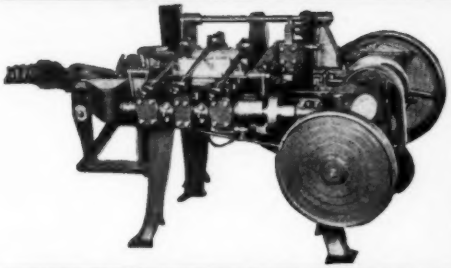
Later the Nazis banned Gibbon's "Decline and Fall of the Roman Empire" because of its unfavorable judgment of the Germans during the first centuries of the Christian era. They also outlawed Schiller's "William Tell" because of its glorification of revolt against conquerors.

Since the Nazi occupation of most of Europe, tens of thousands of other books and pamphlets have been banned, burned and destroyed, with the Germans guarding the content of each occupied country's literature by setting up tight censorships, supervising printing plants, and regulating the supply of paper. School textbooks have either been replaced or revised, and works contrary to "the German interest" have been placed on proscribed lists.

After the invasion of France, the Nazis drew up a "Convention on the Censorship of Books" under which French publishers and librarians were compelled to "withdraw from libraries and from sale" all books undermining German prestige. The convention specified that all French editors would be personally responsible for published material.

TO MEET TODAY'S *INDUSTRIAL REQUIREMENTS*

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The Nilson Automatic Metal and Wire Forming Machine meets today's industrial requirements. Here are some of the features of this machine: Open construction of press and forming tools. Patented slide feed with an independent cam-operated wire gripping device. Power operating wire feed is transmitted through a straight line.

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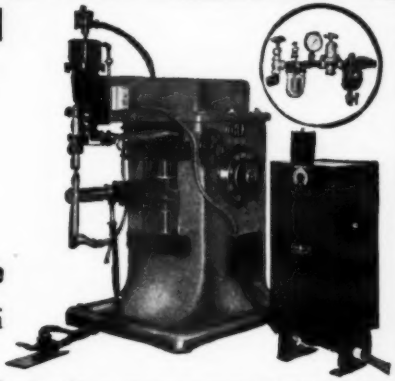
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Spot Welder KT Model Press Type



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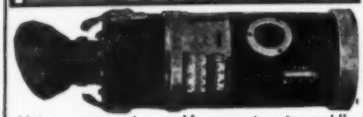
Air Operated, Oil Lubricated with Air Gauges for controlling pressure.

Water Cooled Electrodes — Refrigerating System may be added for High Production.

For additional information outlining exactly how this new welder will increase your production. Send us complete details regarding your welding problem. These Welders are individually designed to fit your needs.

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FOR LATHES UP TO 16 INCH SWING. OTHERS BUILT TO YOUR SPECIFICATIONS



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SPEED-UP YOUR PRODUCTION with
G-W—Special "C" Tool Bits
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GERITY-WAYNE TOOL COMPANY
6432 Cass Ave. Detroit, Mich.

DOC. STEELSTRAP DISCUSSES WOMEN

"The Women in My Life" is the intriguing title of an article by Doc. Steelstrap, Acme Steel's, top-hatted trade character, in the current issue of the company's 12-page house organ, Acme Process News.

Indicating the importance of reinforcing war shipments, the well-told and illustrated story reveals how strap-applying jobs in many industries are now done by women. The applications pictured range from baling army twill to strapping cases of superchargers for warplanes.

Handling naval torpedoes enroute to loading plants, bundling salvaged tinned steel sheets, skidding of cut stone and bracing lifeboats in cars are a few of the other interesting strapping applications shown in issue No. 11 which is available without charge from Acme Steel Company, 2821 Archer Ave., Chicago.

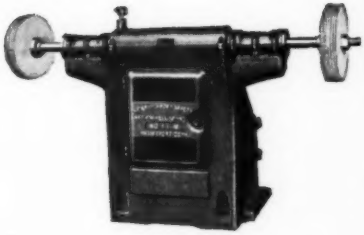
V-BELT CATALOG MANUAL

A new, complete catalogue on Veelos Adjustable V-Belting is announced by Manheim Mfg. & Belting Co., Manheim, Pa. This is the link V-Belt which is sold in rolls. The manual shows in detail the sequence of operations to take the belt apart at any point with an ordinary screw driver, and then it shows the necessary steps to couple the belt together again without use of any tools whatever. It shows an illustrated procedure to be used in installing the belt on the drive.

The catalogue also illustrates a number of typical applications. It gives complete engineering data and a sample calculation for determining the necessary size of a drive. In a Table it gives the proper length of Veelos V-Belt to use according to the standard formula, which is also given.

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MOTOR DRIVEN BUFFING LATHES—



NO. 17 "M" TYPE BUFFING LATHES ARE WELL ADAPTED FOR POLISHING — BUFFING OF LARGE AND AWKWARD WORK.

The "M" type Buffing Lathes are well adapted to the Buffing and Polishing of large or awkward work, which requires ample room for swinging; also in many instances where a satisfactory spindle speed may not be obtained with direct connected alternating current motors. Here a speed may be selected which will meet most requirements.

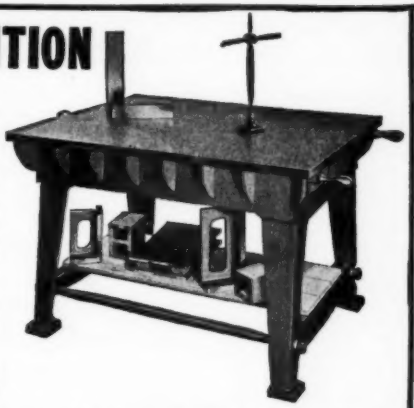
Features V belt drive, ball bearings throughout, accurately ground high carbon steel spindles and has a varied speed range easily obtained.

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BRIDGEPORT 1304 W. Broad St. CONN., U. S. A.

A USEFUL ADDITION



Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

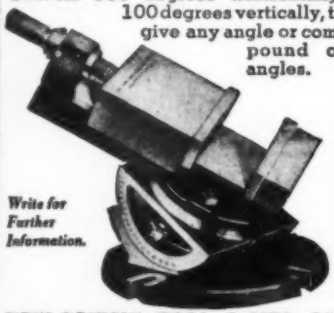
We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. *Write today for full information.*

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UNIVERSAL VISE

Swivels 360 degrees horizontally, 100 degrees vertically, to give any angle or compound of angles.



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NEW BRITAIN, CONN., U. S. A.

PROTECTING THE WORKING GIRL

Recognizing that the advent of women in industry presents a problem for specialized safety equipment, The Boyer-Campbell Safety Division, Detroit, announces a catalog exclusively devoted to this purpose.

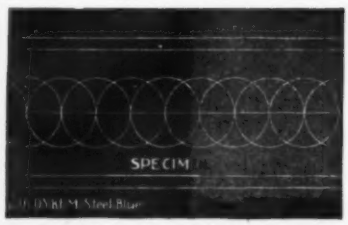
It describes equipment for the working girl's protection from head to foot, including clothing and caps by nationally known costume designers. Note that none of these styles has lost sight of protection—the primary motive of clothing for the factory.

REAMER PRICES REDUCED

A 20% reduction in prices on W-S standard reamers became effective April 1, according to an announcement made by Wendt-Sonis Co., Hannibal, Mo.

The reduction applies to the company's entire line of both straight and taper shank carbide-tipped reamers ranging ¼" through 1½".

"These new, lower prices," states Alec Sonis, Gen. Mgr. "are the direct result of greatly increased volume on reamers, coupled with recent acquisition of new production facilities."



DYKEM STEEL BLUE
STOPS LOSSES
making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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Made in various types and sizes from 1/30 to 2 H.P. Pumping capacity up to 200 g. p. m. Many patented and exclusive features.

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1808 Reading Rd. Cincinnati, Ohio

We have in stock the following high speed Taps, cut thread:



Please Send for Our Catalog.

PLUG SIZE	PRICE EACH	GUN SIZE	PRICE EACH
6/32	$ .70	6/32	$ .80
8/32	.70	8/32	.80
10/32	.75	10/32	.85
10/24	.75	10/24	.85
12/24	.80	12/24	.90
1/4 x20	.85	1/4 x20	.95
5/16x18	.95	5/16x18	1.05
3/8 x16	1.10	3/8 x16	1.25
7/16x14	1.30	1/2 x13	1.70
7/16x20	1.30		Discount of 40% off on all these taps
1/2 x13	1.55		
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We also carry a large stock of H. S. Centre Drills, Jobbers, Wire Gage, letter size and Taper Shank high speed Drills, Hack Saw Blades, Emery Cloth, Tool Bits, Files and Diamond Dressers for Emery Wheels.

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"TIME SAVER"

Improved holder with interchangeable steel type makes part number changes a simple operation. Turn a screw to make the change. . . . Guaranteed for years of service. Used by hand or press, it's a time and money saver.



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Pratt Grinding Gauges caliper external cylindrical jobs while work is in motion or at rest. Adapted to straight or tapered work. Tolerances of .0001" plus or minus easily maintained. Visible check on out of roundness, rough grinding and chatter. Cannot grind work undersize unknowingly. Easily installed on any grinder. Pratt Grinding Gauges increase production, eliminate scrap and assure accuracy. A modern precision tool, ruggedly built.

Send for Bulletin

American
DIAMOND TOOL & GAUGE CO.
15920 WOODINGHAM • DETROIT, MICH.

DRY FILM LUBRICATION

There are many types of equipment where design, operating conditions, or other factors make fluid film lubrication either impractical or entirely infeasible. When this is true, it has been found, in many instances, that films formed from dispersions of "dag" colloidal graphite perform as an effective dry lubricant. These films are imparted by one of the following three methods, depending on prevailing conditions:

(1.) Chemical coatings impregnated with "dag" colloidal graphite. (2.) Dispersions of "dag" colloidal graphite in a binder. (3.) A graphite surface applied by dipping, spraying, painting, etc., and evaporating the fluid carrier. (In this case no added binders are used to anchor the film.)

The following list is an indication of the extent to which "dag" colloidal graphite is at present being used to provide dry film lubrication: extrusion dies, wire drawing dies, upset forge punches, drop forge dies, die shrinking, permanent molds, die casting, tire molds, glass molds and sticking tools, thin wall magnesium alloy drawing, press fit lubrication, cylinder liner insertions, threads (for easy removal later), oxygen system line connections, mechanism parts, knife blade switches, high temperature lubrication for normalizing and annealing oven conveyors; kiln car bearings, core oven chains, mold-drying conveyors, baking ovens, transfer plates, gaskets and packings, infra-red lamp receptacle parts, carbon holders on welding machines, searchlights, bomb fuse gears, pump parts, clutch faces, locks, aircraft heaters, conveyor chains, saw blades, shock absorber shafts, degreaser conveyors.

Conductive films formed from "dag" colloidal graphite are also used for bleeding static and for electro-static shielding.

* * * * *

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Give Now to The
RED CROSS

HART'S Divided Machine Vises



These Vises will hold work the full length of the table, if necessary. Useful on planer, milling machine, surface grinder or drill. They adapt themselves to any shape and can be used on sides of table as well as ends. The jaws are tool steel and hardened, the angle holding the work down on the table.



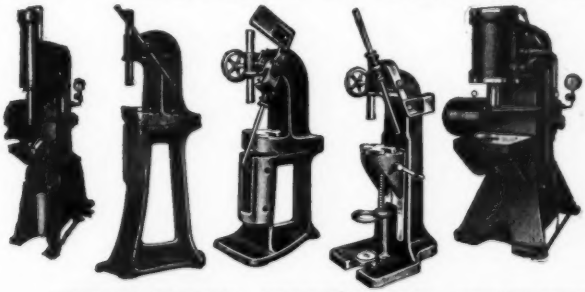
HART'S Milling Fixtures

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—¾" to 4".

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PRECISION WORK IN REARMAMENT

65 Standard Styles and Sizes. Manually operated presses ¼ to 35 tons pressure. Motor driven hydraulic presses 1½ to 30 tons pressure.

Let us send you our catalog No. F.

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NASHUA Est. 1883 NEW HAMPSHIRE

VICTOR VERTICAL HYDRAULIC DRIVE BORING MILL



Answering demand for a new type of vertical boring mill with fluid hydraulic drive, to mill large turret rings for tanks, engineers of the Steel Tank Corp., Detroit, designed and built the required machine in less than five months.

The mill, known as the Victor No. 90, has a 90" table and open side. It is hydraulically operated, both as to feeds and drive, by push button control, with a wide range of speed changes possible without stopping to change gears, etc. Pressure feed lubrication with worm drive directly under the tool head is said to provide smooth operation at all speeds.

HYDRAULIC PRESS BULLETIN

With much interest centering upon the Guerin process of using rubber pads to form sheet around dies, the latest issue of HPM, organ of Hydraulic Press Mfg. Co., Mt. Gilead, O., is timely and of importance. Profusely illustrated with large, clear pictures, and equally clear and engrossing text, the case of the Guerin method is convincingly set forth.

Executives, concerned with problems in pressing, will do well to get on HPMs subscriber-list, for these developments in pressing "know-how".

"Aside from its attractive appearance, this publication is gaining popularity as a machine tool buying guide, because it contains such an unusually large volume of engineering specifications, packed into small space", says H. J. Dods, of the firm's Technical Service Dept., in commenting on the book.

The book is in two colors, richly illustrated, file-handy, 8½x11" size, plastic bound and has 47 pages, with all matter attractively and conveniently arranged.



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For economical polishing, lapping or finishing of gears, shafts, dies, gages, ball races, long rods, etc.

Built to meet the requirements of those desiring a heavy constructed, smooth running machine of highest quality.

Has large built in motor with variable speed control, using REEVES standard pulley and belt.

Smooth automatic brakes act instantly when switch is thrown. Collets or chuck may be used.

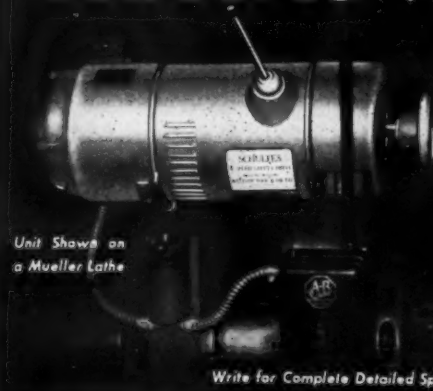


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"SCHULTES" . . . *The King of Motor Drives!*

ALL HELICAL GEARED,
UNSURPASSED IN POWER,
EFFICIENCY, SAFETY
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Unit Shown on a Mueller Lathe

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MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S. NAVAL AIRCRAFT FACTORIES

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(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10" Table; Model E.L. 12" Table.

BEWARE OF IMITATIONS!

Our machine carries the Butterfly trade mark.



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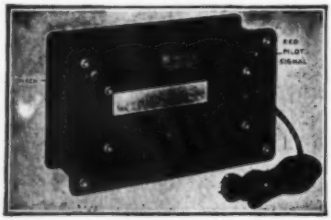
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Price is only $32.50, complete as shown.

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Save Time and Weight on MACHINE SHIPMENTS

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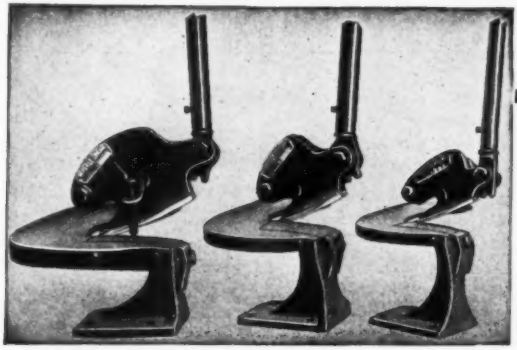
Special applications of Signode Anchor Strap are being made for machinery and machine tool manufacturers. Manufactured parts, complete assemblies are anchored and reinforced for greater shipping safety in boxes or crates, or on skids.

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If you're cutting straights or irregulars on War orders you can speed 'em up and eliminate distortion with a BEVERLY Bench-Type Shear. Order No. 1 for 14 Ga., No. 2 for 10 Ga., No. 3 for 3/16" mild steel and 10 ga., stainless.

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Almond

GEARED SCROLL LATHE CHUCK



Adaptable to all types of work, this Almond Geared Scroll Chuck is of solid one piece construction, semi-steel castings with nickel alloy content giving close grain with strength.

Regularly furnished with two sets of jaws. Soft Blank Jaws are also available for machining to grip odd shape pieces.

Almond Universal Chucks are manufactured in sizes from 4" to 15".

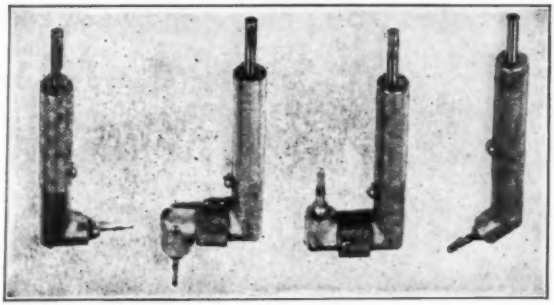
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T. R ALMOND COMPANY

ASHBURNHAM, MASS., U. S. A.

INVINCIBLE TOOLS

A wide range of tools and attachments for use in portable units and flexible shaft machines is offered by the Invincible Tool Co., 611 Empire Bldg., Pittsburgh, Pa.



Many of these are illustrated in two attractive new bulletins which show how Invincible equipment is contributing to the war production effort. In many difficult angle jobs, these attachments will afford a ready solution.

Included in the bulletins are numerous dimensional drawings and tables of specifications, giving complete data on the many types of tools available. Included in the line is a vertical milling or drilling head for horizontal boring or milling machines—also a double angle head. Many different types of attachments are offered for converting portable drills into angle tools. An internal spline grinder is also available.

• • • •

Buy U. S. War Savings Bonds and Stamps

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Handles will fit gages of standard size. Precision made for accuracy of fit and long life.

These steel handles are economically priced and can be had in any quantity.

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SPEED YOUR RIVETING OPERATIONS

A great help in War Production, these **GRANT** Riveters are available in Noiseless Spinning and Vibrating Hammer types. Also Vertical and Horizontal Multiple Spindle Spinning Machines.





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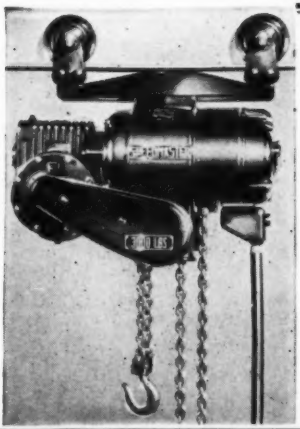
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C E Station, Bridgeport, Conn.



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DRILL JIG BUSHINGS
and
OTHER PRECISION ITEMS
for
VICTORY!
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ACME INDUSTRIAL COMPANY
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THE FAST, RUGGED HOIST
FOR STEADY WARTIME SERVICE

Here's why—Few moving parts plus simple design keep Speedmaster maintenance down. With sturdy construction, Master gear head motor, worm gear bathed in oil, antifriction bearings throughout, the Speedmaster is built to take tough wartime service. Speedmaster runs fast, stops quick and holds tight. Fourteen models and speeds to 60 feet per minute to meet a wide range of application.

Write or wire—To get the latest Speedmaster literature and the name of your nearby Master Representative, write or wire us today.

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INDUSTRIAL EQUIPMENT DIVISION • DAYTON, OHIO



REDUCES A.W.O.L.

A plan reported as effective in reducing absenteeism has come from an "outside" source. Yet it has won approval of war-plant executives, military production executives, C.I.O., A.F. of L. officials and personnel managers; perhaps because it attempts to approach the problem with understanding of the workers' viewpoint.

The man who developed this plan, Lew Shalett of Chicago, explains the basic idea back of it in this way:—

Absenteeism is a minority problem. The vast majority of American men and women workers are on the job, full-time, day-in and out, doing their level best to help speed victory. But the absentees, although their total number is relatively small, do a great deal of damage by slowing up production of their loyal fellow-workers.

To reduce absenteeism, the willful absentee must be appealed to at the most vulnerable point. Like all the rest of us, he wants the esteem of his fellow-workers. Consequently, one of the aims of this plan is to make a worker feel that if he stays away from the job, regardless of whether it's simply to take a day off, or because of a transportation, food or household problem, his fellow-workers point the finger of scorn at him.

In short, they look upon him as a deserter. As one of the most effective appeals in the series puts it, the man who stays away from the job may in fact be a murderer; because due to his absence, the war lasts longer—and American lives are lost—unnecessarily.

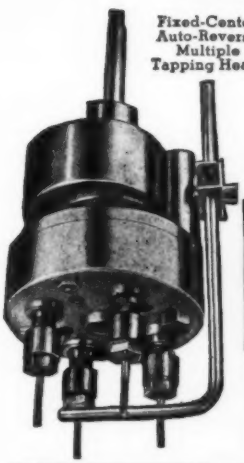
The emotional appeals to which Mr. Shalett refers are dramatized with photographs of real people, reproduced in giant lithographs prominently placed through the plant. The locations for these messages are scientifically selected. New inspirational appeals are presented to workers at frequent intervals.

Sheldon-Claire Company, 520 North Michigan Ave., Chicago, developed the program.

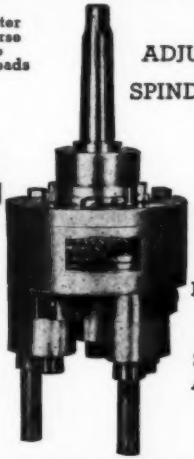
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STAPLETON, STATEN ISLAND, N. Y.

MULTIPLE HEADS



Fixed-Center Auto-Reverse Multiple Tapping Heads



ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles



Super-Sensitive Fixed-Center Multiple Drilling Heads



THE CATSKILL

MODEL "D-2" ABRASIVE CUT-OFF MACHINE

The new model "D-2" Catskill Abrasive Cut-Off Machine embodies all the features essential to fast, abrasive cutting, as well as many new features.

Designed as a dry unit, the pedestal base is so arranged as to permit the use of a coolant system for wet cutting. Available with slower speed motor for high speed steel saw cutting of non-ferrous metal. Swivel vise of V block type allows cuts from right to 45 degree angles, and can be rapidly locked in place. Equipped with stop gage. Work is held by adjustable jaw vise, foot operated.

★ ★ ★ THE CATSKILL METAL WORKS, INC.

CATSKILL, NEW YORK

PALMGREN
ANGLE VISES



DRILLING
MILLING
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Solve Difficult Angle Jobs

- ★ For Tool Room — Production Line — Bench.
- ★ Speed up work — End Makeshift Methods.
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- ★ All Parts Accurately Machined.
- ★ Jaws Hardened Steel — Plain or Grooved.
- ★ Made in Sizes from 1½" to 8" Jaws.


MILLING


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Write for circular O-6 "101 Angle Operations" and complete line of PALMGREN Vises.



CHICAGO TOOL & ENGINEERING COMPANY
Mfrs. of PALMGREN PRODUCTS for over 25 years
8384 South Chicago Avenue, Chicago, Ill.

PRECISION WORK AT ANY ANGLE

CUTTING OFF

Problems involving cutting off jobs are many. The machine best suited to one plant and one kind of stock may by no means be the best for others. Metal sawing machines using inserted-tooth circular saws are not outmoded. Some show remarkable strides in design.

One lately encountered, cuts off bars in multiple. It has a 60° fixture in which 34 bars of ½" stock, or 4 bars of 2", may be cut at one time. Saw blade is 16" in diam., and flooded with coolant during cut.

Special ways of clamping and feeding work are at hand.

There is an efficient cutting-off machine for circular tubes and solid rounds to 4⅝" diam. It uses tools held in slides for the operation.

Smaller machines exist for lower high capacities of 2⅛" and 3⅛". Stock is revolved for cutting by a driving head. Material is fed from the left-hand end through driving head to contact an adjustable stop mounted on a hinged arm. Feeding is done through a pair of lever-controlled wheels.

Cold sawing machines that feature hydraulic feeding and clamping, usable for heavy stock up to 16" round and 14½" square, have many good features. A number of speed changes on the cut is afforded. They have enclosed drive, push button control, and are rated high at cutting shell slugs.

It is a far cry from a heavy stock cutting machine of this kind to one for straightening, measuring and cutting off copper tubing.

Tubing, used in such products as refrigerators, radiators and unit heaters, comes to this machine in coils. Once end of coil is inserted into feeding rolls of the cutoff machine, feeding, straightening, measuring and cutting is automatic. It is adjustable to cut lengths of tubing up to 6 feet in length. Normally, the feeding rate of the unit is somewhere around fifty feet per minute.

(Note: Machines described identified on request. Ed.)

NUTRITION

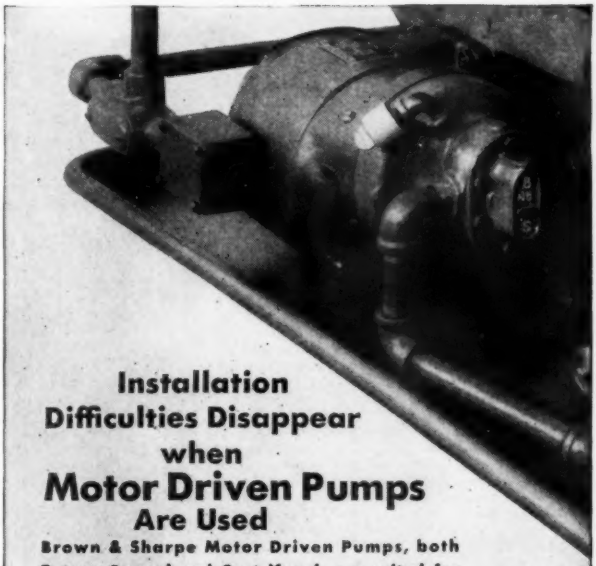
Adequate food is important in reducing absenteeism, fatigue, labor turn-over and production slow-downs, according to Nutrition In Industry Div., Food Distribution Administration.

Where possible facilities should be provided for some type of plant-feeding, plant or concession-managed, and under a trained nutritionist, it states. In a 3-shift plant, the food facilities should be on a 24 hour basis, as some of the problems arising are due inadequate breakfasts, etc. Shift changes should not be too frequent. Workers staying on one shift for at least 2-3 months, get better opportunity to adjust their mealtimes, rest, sleep, etc.

Lunch periods of at least 30 min. are recommended, as are staggered periods, providing greater services to the fullest number of employees. Cold lunches may be as nutritious as hot, if the right foods are selected.

Between-meal feeding is suggested as it has reduced fatigue and accidents. Consumption of milk is to be encouraged, and stress laid upon the right food at the right time. (The FDA maintains a Nutritional News Service, providing articles for plant publications on request.) Nutrition education for women in the families of employees is encouraged. It may be offered through leaflets, lectures, motion pictures, and through clubs and classes, arranged with cooperation of nutrition committees and labor-management committees.

With united efforts of management, communities, state and Federal agencies, increased dependence of employees upon in-plant feeding can not only maintain, but can improve the health, stamina and production output of war-workers, as an aid to Victory, says the statement of Nutrition In Industry Div.



Installation Difficulties Disappear when Motor Driven Pumps Are Used

Brown & Sharpe Motor Driven Pumps, both Rotary Geared and Centrifugal, are suited for mounting in almost any convenient position on the machines they serve. Illustration shows geared model installation—horizontal mounting. Send for catalog listing complete line of Geared, Vane, Centrifugal and Motor Driven Pumps. Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.

B·S

BROWN & SHARPE PUMPS



Calling all FLUX USERS

YOU CAN make perfect welded, brazed or silver soldered joints with Fluxine Fluxes. There are 89 different Fluxine Fluxes, each compounded for definite metal-joining jobs. If you are having difficulties, explain them to Krembs and Company, an organization of Consulting, Welding and Brazing Engineers. Tell the metals to be joined, their guage, composition, finish, the joining process, etc. Recommendations will be made by the originators of non-bubbling, quick flowing fluxes. Besides, you will receive a free sample with instructions for use. Write today.

KREMBS AND COMPANY

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Chemists and Metallurgists Since 1875

FLUXINE #43

For Silver Soldering Stainless Steel, with low melting Silver Solders. Most economical for brazing shells with Silver Solder rings.

Answers Navy Spec. No. 51-F-4A; Air Corps Spec. No. 11316-A; Federal Ordnance Dept. Spec. No. AXS-500.

FLUXINE #18

For gas welding stainless steel.

Meets Navy Spec. No. 51-F-3A; Air Corps Spec. No. 11314. For automic hydrogen welding, use Fluxine No. 18 Special.

TRADE MARK **FLUXINE** REG. U. S. PAT. OFF

FLUXES TO JOIN ALL METALS

3-MAN PLANT WINS "E"

When a Yankee makes up his mind to do something, the job's half done. If he doesn't get a "break", he'll make one and then take advantage of it to accomplish his aim.

It was just such determination, mixed with a lot of hard work, that won the coveted Army-Navy "E" award for Harold C. Powers' machine shop at Cos Cob, Conn., and brought him the additional honor of having the second smallest shop in the nation to win the award.

Records show that Powers has only two full-time employees in addition to himself. He needed more help, so his wife went to work in the shop on a part-time basis. Three other part-time helpers were secured, two high school boys who come to the job after school and the milkman who reports after finishing his route.

Powers' shop formerly was a small automobile repair shop. When the Japs attacked Pearl Harbor, it was converted into a machine shop to turn out metal fixtures for small naval craft. His plant is known as the Diamond Hill Machine Shop.

In January 1942 he secured a small contract from the Vought - Sikorsky Div., United Aircraft Corp., for small plane parts. Business began to hum. He filled contracts ahead of schedule and had no rejections.

More orders came in and Powers' record was brought to the attention of the Navy Department. It was then that he had to increase his "force" of workmen and secured the part-time help.

The former automobile mechanic did not have smooth sailing. Increased business meant more machines which were "impossible" to obtain. Since the word "impossible" was not in Powers' vocabulary, he got the machines—by making them from discards picked up in junk yards.

The shop is not bothered by the much-discussed problem of absenteeism.

Off the Floor Deliveries!

ON

TRINDL SUPER INDUSTRIAL ARC WELDER

DESIGNED FOR HIGH SPEED PRODUCTION ARC WELDING



TRINDL SUPER INDUSTRIAL ARC WELDERS, the result of many years of careful engineering and "job tested" research, are rolling up impressive production records. Acclaimed for superior performance, ruggedness, dependability, and economical operation. For better, faster welding, easy-to-operate TRINDL SUPER INDUSTRIAL ARC WELDERS will help step up your production schedules 20% to 40%. Manufactured in a range of distinctive sizes to accommodate every type of shop and production welding job. Trindl Welders, Electrodes, supplies and accessories, available for immediate delivery, will save you both time and money.

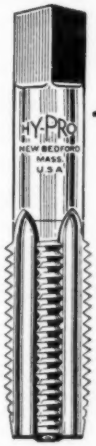
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High Speed Steel Hand & Machine Screw Taps

Cut Thread; Commercial and Precision Ground Thread Taps, Special Taps.

Clean, Sharp Threads for High Production

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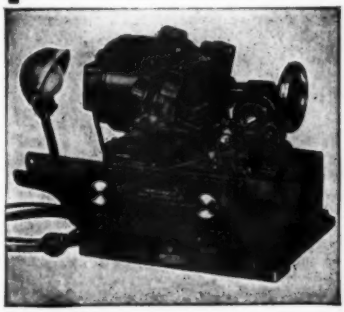
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Recondition YOUR SAWS AT VERY LOW COSTS

Howe - Lindsey Automatic Saw Sharpener, the fastest and most compact machine for sharpening hack saws, band saws, or metal slitting saws. Automatic in action, requiring unskilled labor; will produce nearly perfect cutting tooth, provides for greater production and longer life of blades, saving steel.

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● Aro Rotary Burrs and Files for "cleaning up" operations on aluminum castings are effecting big savings in time. Speeds of 17000 r.p.m. are showing the following results:

1. Greatly increased production due to high speed • 2. Better finish • 3. Burrs do not load as fast • 4. More pieces per burr

Numerous operations can be performed more quickly and more efficiently with these small powerful Pneumatic Tools.

Aro Field Engineers welcome an opportunity to give you the benefit of their wide experience in helping you solve production problems involving Grinding, Burring, Filing, Drilling, Screwdriving, Nutsetting, etc. Write Aro Equipment Corp., Bryan, Ohio.

THE ARO EQUIP. CORP. ARO BRYAN, OHIO

PNEUMATIC TOOLS

ENGRAVING MACHINES

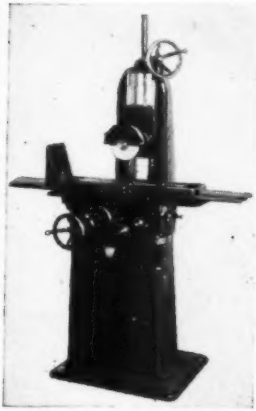
Among engraving machines at work in the metal industries are a considerable number of interesting bench models. In some cases, the machines are designed so that electric etching can be done instead of engraving, when desirable. One such tool of pantographic type, which has an electric etching head interchangeable with an engraving head, works from master copy type when desirable. It is suitable for wide range of small work.

Some of the bench-type machines furnished engrave on flat or round surfaces, and handle both block and script lettering from master type furnished with the machine. One such can easily be used for reproduction of designs or emblems, tracing them from original drawings. In less than an hour, it is said, a man who has never engraved before, can turn out a job of surprising quality, whether on iron, soft steel, soft metals or plastics.

One of the places where an inexperienced engraver may have trouble is at the very start of an engraving cut, when the tracer is being brought into contact with the master. This has been entirely overcome in the design of one pantograph-type of engraver, in which the engraving spindle is moved to and from the work under spring pressure control.

Such a provision allows the tracing stylus to be placed into the groove of the master before the engraving spindle contacts the work, thus maintaining control that is absolute all the way through. This particular machine has the ratio of the pantograph adjustable, so that different sizes of engraved units may be obtained from the same master. An interesting feature of this machine is a universal vise which can be used for handling all kinds of indexing, layout work and spacing.

Engraving machines of two and three-dimensional style, as built by manufacturers of long experience in this type of work, are larger than the bench-type machines mentioned.



SURFACE GRINDERS

Hydraulic Feed – Hand Feed

No. 2 HAND FEED 6x22
No. 2 HYDRAULIC FEED 6x22
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AMERICAN DRILL GRINDERS

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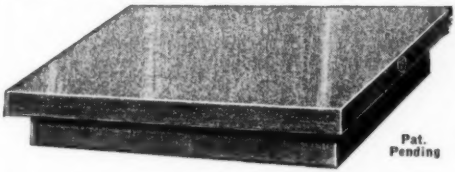
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77 W. Washington Street
CHICAGO, ILL.

Manufacturers of Dependable Grinders for Over 25 Years

HERMAN *Precision Granite* SURFACE PLATES

Special Sizes on Request
Prompt Delivery
weights 12"x18"— 75 lbs.
18"x24"—160 lbs.
20"x30"—275 lbs.
24"x36"—480 lbs.



Pat. Pending

Check these Features

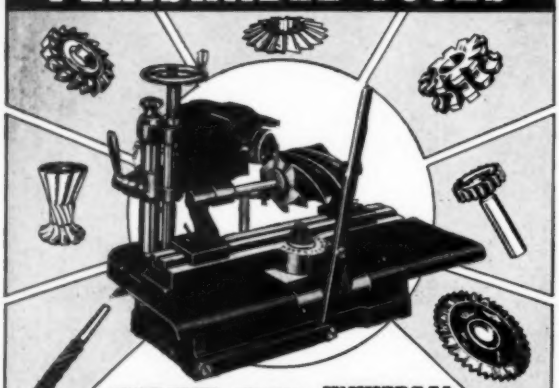
- Replaces War Essential Metals
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- Non-Abrasive
- Hard, Precision Surface
- Accurate to the Most Exacting Requirements
- All Around Sturdy Construction
- Practically No Wear-out with Normal Care

After extensive research certain types of extremely hard granite were found that are ideal for surface plates. The working surface of each PRECISION GRANITE Surface Plate is processed flat while being supported on a three point bearing. These bearings remain on the plate permanently so the plate can only be used in the manner in which it was finished. The diamond-hard surface of this surface plate is practically indestructible under normal conditions, assuring years of accurate service. The specially treated, non-abrasive qualities assure practically no wear on the finest tools. They may be used at or near grinding machinery without the surface becoming charged with abrasive particles. It is sufficient to merely wipe off the surface and the plate is ready for use.

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HILCO UNIVERSAL TOOL and
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Perishable tools — so difficult to obtain today — last longer, cut better and quicker if kept always sharp. The HILCO Universal Tool & Cutter-Grinder costs only $495.00 F.O.B. Chicago, complete with Universal Index Dividing Head, step collars, ¼ hp. 110 volt universal motor, index fingers, grinding wheels, etc. Quick delivery.

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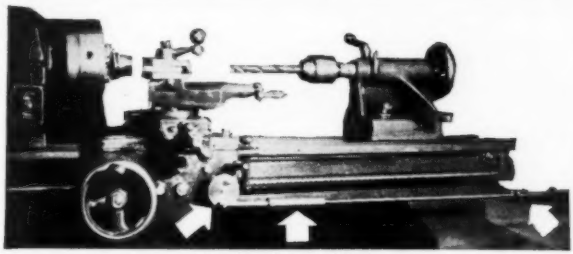
BERCO MANUFACTURING CO. 423 W. Superior St. Chicago, Ill.

CRANKS

Cranks offer a rather interesting study in machine design. While in one sense their function is the same, converting rotary motion into reciprocating, there are variations in their application. A crank, for instance, may pre-suppose either a crank disk or a crank shaft, and sometimes more than one crank will be involved in a given motion. One case where this is found true is in design of a large suspension press, on which it was necessary for the face of the slide to be always parallel with the press bed, even though great thrusts might be present, tending to throw it out of parallel. This problem was solved by arranging two crankshafts of massive type in parallel at the top of the press, each of the two crankshafts actuating two cranks, and each of the four cranks actuating one of the four corners of the press slide. The throw of all cranks being equal, tilting of the press slide was made impossible, and a first class job was obtained as a result.

Most of us are acquainted with the principle of the crank gear mechanism as used on metal working shapers, to make it possible to change the length of the ram stroke. Therefore the basic principle of the gear will not here be gone into. It is interesting to note, however, that in some cases this machine refinement is being even further enhanced in modern metal-working shapers, with reference to the ease and the accuracy with which the shaper operator can change the length of the stroke. A graduated scale is provided on the machine for his convenience. He simply inserts the stroke crank and makes adjustment according to the reading of the scale. The removal of the crank automatically locks the mechanism, and there is not the slightest chance for damage, as it is not possible to leave anything loose.

It is interesting to observe how ideas are borrowed and carried from one industry to another and from one class of machinery to another. This comes to mind as we consider the crank gear of the metal working shaper. This idea has been carried over to a crank disk incorporated in an automatic stroke belt-sander.



For Increased Precision & Production

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AMERICAN AUTOMATIC CARRIAGE STOP GAUGE

Model 2. Fits Atlas, Logan, South Bend, others

Accurately, automatically stops carriage at any set points in production of duplicate pieces. Sets from one to eight stops or more. Operator can start the cut and walk away from the lathe. Makes it impossible to spoil work. Impossible for carriage to run into chuck or headstock. Invaluable in training shops and schools. WRITE TODAY FOR DETAILS. Dept. B.

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NEED GOOD COOLANT PUMPS?



BRADY-PENROD MODEL 7500 Centrifugal coolant pump and tank—a neat, compact unit highly suitable for use where abrasives are a factor.

Good pumps PAY. Buy the kind used as *standard equipment by many leading machine tool manufacturers*—BRADY-PENROD. Model 7500, shown above, is one of a complete line designed to meet every need. It handles all coolant liquids—kerosene, solubles, light and medium oils, etc., 4 to 100 g.p.m. Tank sizes, 6, 15, 30 gal. or larger, with as many hoses and nozzles as required. Discharge pipe is cast integral with pump and brought to outside of tank. The hinged cover allows cleaning without disconnecting return line.

All BRADY-PENROD pumps have heavy-duty, standard construction NEMA motors, ⅛ to 1 H.P., any current, phase, cycle.



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TO HIT 'EM H-A-R-D-E-R



1943 promises to be the hardest year this country has ever faced. Every effort, and every dollar of national income not absolutely needed for existence, should go into war work and War Bonds.

In the Pay Roll Savings Plan, America finds a double-barreled weapon—for fighting power today, buying power tomorrow.

You've undoubtedly got a Pay Roll Savings Plan in your own plant. But how long is it since you last checked up on its progress? *If it now shows only about 10% of the gross payroll going into War Bonds, it needs jacking up!*

This is a *continuing* effort—and it needs *continual* attention and *continual* stimulation to get fullest results.

You can well afford to give this matter your close personal attention! Actual case histories prove that a successful Pay Roll Savings Plan gives labor and management a common interest that results in better understanding. Misunderstandings and wage disputes becomes fewer. Production usually increases, and company spirit soars. And it goes without saying that workers with substantial savings are usually far more satisfied and more dependable.

For sound business economy, now and when the war is won, check up on your Pay Roll Savings Plan, *today!*



You've done your bit Now do your best!

This space is a contribution to victory today and sound business tomorrow by

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The Pug Knives shown above tell a graphic story of the amazing wear resisting qualities of COLMONOY hard-surfacing alloys and overlay metals.

1. New, 24 lb. pug knife, made of high alloy steel.
2. and 3. Same type, after only 3 months of service. Worn beyond efficient operation, with several pounds of high alloy steel worn away.
4. and 5. Same type. Each blade coated with 1½ lbs. of COLMONOY. In constant use for over a year, and still going strong.

COLMONOY is playing a vital part in the machine tool industry. Use it on parts subject to great wear—lathe centers, dogs, chip breakers, wire straightening shoes, thrust bearings, screw machine fingers and cams, grinder feed fingers, forming and drawing edges, etc.

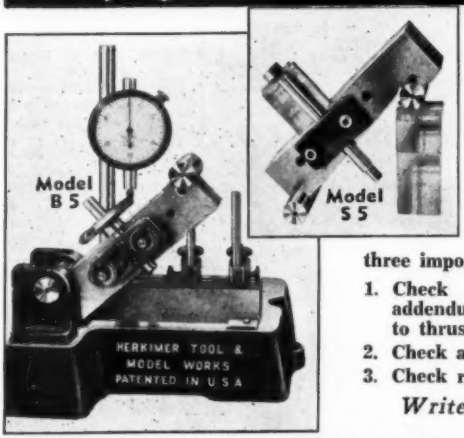
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720 FISHER BUILDING **DETROIT, MICH.**

Branch Offices At New York City, Blasdell, N.Y., Chicago, Tulsa, Los Angeles. Other Branches in Canada.

Simplified BEVEL GEAR GAUGING



No difficult operations, involved calculations or intricate manipulations.

With one set-up on these tools, any operator with ordinary gauging experience and a knowledge of blue print reading, can perform these three important operations:

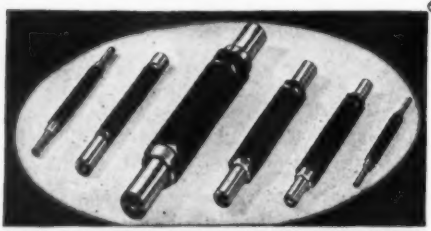
1. **Check dimensional accuracy of the addendum cone (gear face) as related to thrust face of hub.**
2. **Check accuracy of cone angle.**
3. **Check run-out of gear face.**

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DUBLIFE
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UNITED PRECISION PRODUCTS CO.

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GEAR CHECKING

Checking or inspection of gears has practically become a science. Advances in inspection play no small part in suggesting still further steps toward gear perfection.

As a case in point, in checking the lead on helical gears, what shall we say of a comparator that will allow one to read errors to tenths of thousandths? This equipment allows one to check spur gears, to determine if tooth faces are in parallelism with the axis of gear, heat distortion of teeth on hardened gears, and exact position and amount of crowning on crowned tooth gears. Thus, arrived at a given standard, it is possible to check gears with reference to that standard.

It has been aptly said that there are three basic elements in helical gearing: helical lead, base pitch and involute profile. One firm which has gone deeply into intricacies of proper gear inspection, has built three different measuring machines. One has reference to one of these elements only. Thus, they provide a helical lead measuring machine which determines accuracy of the lead helical gear, checking all the way from zero to infinite lead. They furnish a base pitch and space measuring machine, which measures the base pitch of spur and helical gears, or the spacing of spur, helical, bevel and worm gears in the rotational plane.

They also have an involute profile measuring machine, which checks accuracy of gear tooth or gear shaper cutter tooth profiles which have been designed to the involute system.

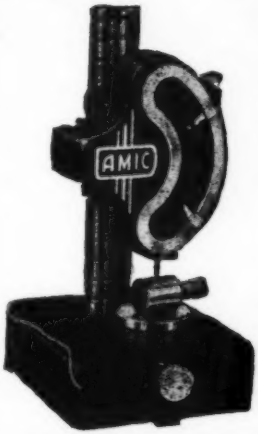
There is little chance for inaccuracies with this group of gear measuring machines.

Will these gears be noisy? One way thoroughly to check this in advance is to mount gears on a "speeder". It has a horn, which magnifies sound of the gears.

(Note: Machines described identified on request. Ed.)

AMIC COMPARATOR

A Precision Indicating Gage



Designed to replace special gages, flush pin, snap, height gages. For accurate, convenient and quick checking of all components, either in the tool room or on the production line. Permits precise gaging throughout the day without eye fatigue. Each division of the scale represents 1/10,000th of an inch. Clear readings on 6" scale with inch and millimeter readings. Magnification is 1000. Measuring capacity ±.003".

Note our improved list of accessories designed to suit your particular measuring problem. Thread measuring device, serrated anvil, vee-blocks, centering fixture, ball anvil and several types of backstops.

AMERICAN MEASURING INSTRUMENTS CORPORATION
240 West 40th Street New York City
Manufacturers of Gages, Jigs, Fixtures and Service Tools

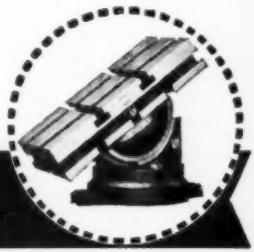
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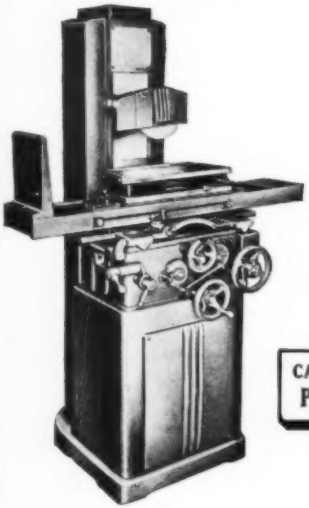
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No. 2 Automatic Precision

SURFACE GRINDER



ANTI-FRICTION

SELF-CONTAINED

PRECISION

GRINDER

SPINDLE

CAPACITY 6" x 12" x 18"

PROMPT DELIVERIES

ATLANTIC MACHINERY CORP.

149 BROADWAY, NEW YORK, N. Y.

COUPLING AIR HOSE

With the ever increasing parade of air-powered devices, including air-powered vises and work-holding devices, air powered arbor presses, air powered chucks, portable pneumatic tools of all kinds, and even pneumatic bar feeds for the automatic screw machine, the air hose and its coupling assumes increasing importance. Firms making a specialty of air hose fittings quite often supply coupling fittings which have extra long shanks, when especially firm anchorage in the air hose is desired, due to a hose being handled a great deal.

There is a type of air hose coupling which really gets a double purchase on the hose, with reference to its grip, for it is so designed that one grip is obtained on the inside of the hose, and another on the outside. These particular couplings, it is claimed, have proved in laboratory tests to take over 5,000 lbs pressure. They are recomended over against a safe working pressure of 1,000 lbs or less. So it can be seen that there is an important factor of safety, as far as air pressure is concerned.

There came to my attention recently a type of pressure hose coupling, well adapted for air hose service. Available in sizes from ⅜" upward, it snaps together and comes apart with ease, manually. It cannot be accidentally disconnected. In addition it has a swiveling action which permits the hose to straighten or rid itself of kinks.

But the real interesting thing about this particular hose coupling is the fact that it incorporates a built-in single or double check valve, in such manner that when the coupling is disconnected, the valve closes and automatically shuts off the pressure. Conversely, when the connection is made, the valve is automatically thrown and held open.

In the use of various air-operated tools, of which there are now so many, it is quite a burdensome proposition to have a separate air line for each tool, even though certain of those tools may seldom be used in practice.

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Sheet Metal Work

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under Government Specifications

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Stackbin offers you unusual facilities to fabricate these boxes and other sheet metal products

Behind these special products stand the designing experience and production facilities of a leading maker of parts and materials handling equipment. You can take advantage of their knowledge of sheet metal fabrication. Write Stackbin Corp., 55 Troy St., Providence, R. I., to find out what they can do for you.

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Announcement to

★

The First Complete Welding Rod Processing Plant Ever Assembled Under One Roof For Demonstration Will Be Shown At Cleveland, Ohio Early in June.

Ernest P. Moslo

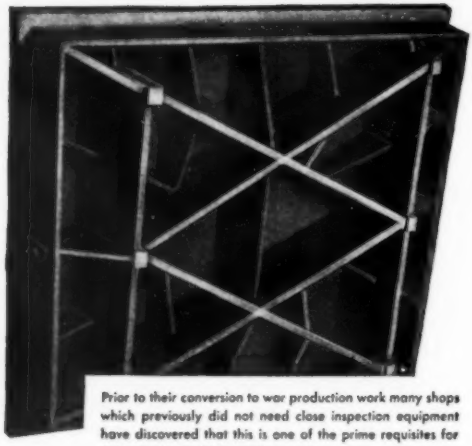
MOSLO MACHINERY COMPANY
Engineers and Builders
9443 Prospect Ave. • Cleveland, Ohio

PRODUCERS
and
LARGE USERS
of
WELDING RODS

★ This plant, complete from wire cutting and feeding machine to final inspection, weighing and packing, will be completely assembled in production line and will be in operation, actually processing welding rods. It is one of a number we have sold to a foreign power. More are under construction, and we should like all foreign purchasing commission officials, welding engineers and manufacturers interested in an operation of this scope to see this plant while it is in operation.

INSPECTION BY APPOINTMENT ONLY
PLEASE WRITE OR WIRE AT ONCE FOR RESERVATION

INSPECTION *is Vital!*



Prior to their conversion to war production work many shops which previously did not need close inspection equipment have discovered that this is one of the prime requisites for turning out precision wartime parts.

Lombard's series of Surface Plates, as well as complete line of other accurate small tools has made possible greater production under the closer tolerances now necessary. Available for general shop use as well as inspection work. Prompt delivery can be had in various grades and tolerances in a wide range of standard sizes from 14" x 18" to 48" x 96". Quotations made also on special sizes and rescraping.

Surface Plate shown is Lombard Commercial Style.

LOMBARD GOVERNOR CORPORATION
400 MAIN ST., ASHLAND, MASS., U. S. A.

especially adapted for practically every kind of screw machine that is found in operation.

When we come to tungsten carbide cutters, for whatever machine they may be, we need to remember that what has always been true of other types of cutters is true of these also. Not all of them are of equal quality, and what shows up as a dollars-and-cents bargain may prove to be anything else than a production bargain.

Hardness, density and uniformity must be rigidly controlled if such tools are to show the maximum cutting yield. And do not forget that when you have a short-lived cutter, to the loss that is yours because of a short life must be added the extra cost of the more frequent re-tooling.

There are manufacturers of tungsten carbide tools who take the long view, and put the utmost into a cutter, even though it costs them more to do it, and they must charge more for it.

CUTTERS

A good machine with a poor cutter of any kind is much like a fine automobile with inferior gasoline in the tank. It is hard to imagine a greater inconsistency, and yet there are many owners of highly efficient and modern machines who pinch pennies when it comes to tooling.

Taking screw machine practice as a case in point, how many machines have you seen where production was slowed because the cutting-off blade that was being used did not clear as it should, and generated a lot of friction? Yet, there are firms which have made this very screw machine cutoff blade matter a specialty, and handle blades which are

If you are looking for very high accuracy in a reaming job, combined with a high cutting speed, you will do well to consider the use of a spiral fluted reamer. Not only is there the shearing action on such a reamer that tends toward stability, but the spiral flutes tend to keep the chips coming out of the work, so they will not foul between the the tool and the hole to mar the finish. With a really good reamer, one must of course have a machine spindle that runs true and that is rigid.

Note: Machines described identified on request. Ed.



BENCH LEGS
HELP WIN THE WAR

Labor saving, time saving will help our boys over there.

Steel bench legs for building short or continuous benches.

W.P.B. has not frozen bench legs, benches, or bench equipment for industrial use. We have a large stock for immediate delivery.

Save that essential time and worry. Get your information on Pollard equipment either direct or from your mill supply dealer.



POLLARD BROS. MFG. CO.
5506 Northwest Highway
CHICAGO, ILLINOIS

BUILDERS 'T' SURFACE GRINDER



HANDY for accurate grinding of dies, tools and small parts.



INEXPENSIVE. Save valuable time. Keep several at hand for ready use.

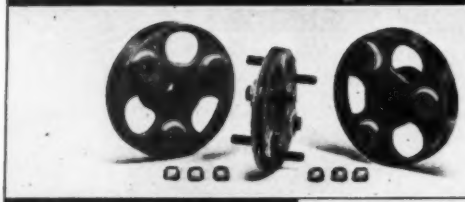


Prompt Delivery.
Send for Bulletin 644.

BUILDERS IRON FOUNDRY
21 Codding St.
PROVIDENCE,
RHODE ISLAND



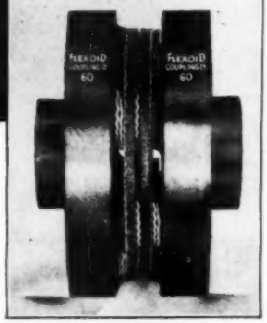
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FLEXOID COUPLING CO., Div.
THE SMITH POWER TRANSMISSION CO.
1545 E. 23rd Street Cleveland, Ohio

There is not much dressing action on such a cut. Unless the abrasive grain is lightly held by the bond, the wheel will dull very quickly.

This type of grinding machine is newer than those with a horizontal spindle. It is, therefore, not so numerous. But some splendid models are made by representative firms, nevertheless.

Cup wheels are sometimes used in small sizes on portable grinders for jobs that can hardly be taken to a surface grinder, as such. One case in which a cup wheel has been used to advantage on a portable grinder is for grinding off the weld flash on heavy, butt-welded bandsaws.

Often where there are surfaces of relatively small area that require smoothing, this method will apply. It is about the only freehand grinding method, excepting the use of a portable belt sander.

CUP WHEELS

The cup type of grinding wheel is used for surfacing jobs mostly. It has found certain other applications. Where surface grinders of the vertical-spindle type are in use, the cup wheel applies. When used, there is a great deal more wheel area in contact with work than is the case when grinding with the peripheral face of a wheel. This being true, the cup wheel is usually of a different structure, with relatively coarse abrasive grains more widely spaced.

Cup wheels used for surface grinding in this manner are usually of soft grade.

The cup wheel was not at work very long before it took a forward stride in design, through the development of so-called segment grinding chucks. The segment chuck, when loaded with abrasive segments, is much like a cup wheel. It operates on the same principle, save for the fact that open spaces are left between the segments.

Thus, the "cup rim" applied to the work is not continuous, but broken into sections. This allows a somewhat better dressing action, and also allows of cooler grinding. There are different makers of these grinding chucks.

(Note: Machines described identified on request. Ed.)

5000 Shapes and Sizes Grobet Swiss Files



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The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss files.

Learn more about these chrome Steel Files that have won a reputation for utmost precision and durability.

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GIRL MAKES PARTS



BENDERS — Di-Acro Bender bends angle, channel, rod, tubing, wire, moulding, strip stock, etc., 2 sizes. Capacity up to ½" cold rolled steel bar.

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"Beat The Promise" on delivery this new way: Use The DI-ACRO System of "Metal Duplicating Without Dies" — and have parts finished before dies could hardly be started.

DI-ACRO Machines — Shears, Brakes, Benders — are precision-built STANDARDIZED units so designed you can readily convert them into highly SPECIALIZED productive machines suited to your own particular needs. You may adjust, alter or remove any of the original contact surfaces, attach operating clamps, guides and gauges, or quickly set up your own forming surfaces or conversions. Either right or left hand operation and mounting of each unit. The result is a practically unlimited adaptability for a great variety of DIE-LESS DUPLICATING.

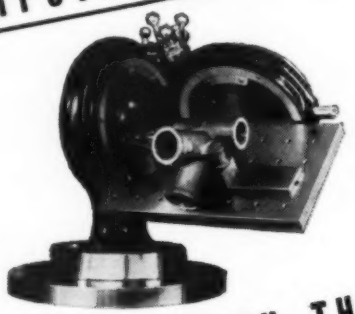
Write for catalog "Metal Duplicating Without Dies".



O'NEIL-IRWIN DI-ACRO PRECISION MACHINES MFG. CO.

314 EIGHTH AVENUE SOUTH • MINNEAPOLIS, MINNESOTA

COMPUTE ANGLES



QUICKLY WITH THE

STUDLER ANGLE COMPUTER

◆ THE STUDLER ANGLE COMPUTER so simplifies layout of die work, survey of castings, and inspection of precision-machined parts that users report it is doing the work in one-half to one-tenth of the time required by the sine bar method. With this instrument, only one set-up of the work is required since its surface plate may be rotated 360 degrees in each of three separate directions of rotation: horizontally, vertically, and radially. A part having a number of angles and related angles may be surveyed in a few MINUTES. For example, the part shown on the instrument above was accurately surveyed in 15 minutes. Model "A", Surface Plate 9"x4½"x½". Model "B" (shown above) Surface Plate 16"x9"x1". Write today for Bulletin No. 2.

THE ANGLE COMPUTER COMPANY

3720-22 MELROSE AVENUE, LOS ANGELES, CALIFORNIA

CUSHIONING

Machine designers and the users often encounter need of cushioning machine motions. Sometimes it is done to hold down noise and vibration. In other cases it is done to provide strain relief, without which expensive breakage might occur. The latter is the case with reference to die cushioning, which has become more of an exact science, continually.

Some press builders now incorporate die cushions right into the press bed, thus doing away with a lot of trouble. One builder furnishes pneumatic hydraulic die cushions for presses already in operation.

It is important, in power press die cushions, that when they yield it be straight downward. To insure that this will be the case, one firm which furnishes pneumatic and hydropneumatic die cushions for all types and sizes of presses, arranges pressure pads so they are guided in long bronze ways. This, it is said, insures against tilting.

There are times when the same idea of arranging a machine element to yield at a predetermined amount of pressure is used, and where predetermined pressure is not great. Such was the case with a tool grinder, originally designed for highspeed steel grinding. Later, it was desired to adapt it to tungsten carbide tools also, without impairing its efficiency for highspeed steels.

In order to do this, a spring-cushioned thrust bearing was incorporated. Then the spindle on which the cup-wheel was mounted gave back endwise at a specific amount of pressure, low enough that tungsten carbide tools could not be harmed.

The arrangement was such that when other steels were ground, this cushioning device could be locked, so that it would not yield.

Rubber has been found a splendid cushioning material in many places and cases. It is particularly good for the cushioning of machine elements against vibration. Riveting hammers of the vibratory type will naturally make a lot of noise unless something be done to reduce it.

In War, as in Peace...

CERRO ALLOYS

SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, for engraving machine models, short run forming dies and other metal-working applications.

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CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc. and for many similar applications.

Cerro De Pasco Copper Corporation

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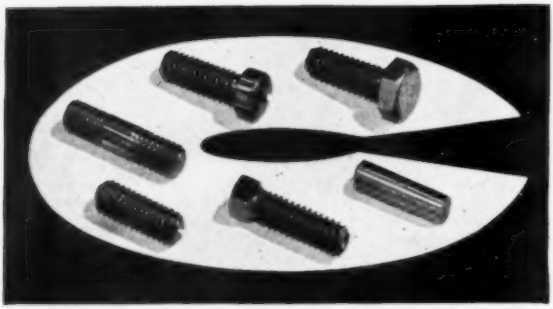
Welding has become a quantity production operation with C-F POSITIONERS because the welders themselves can now position giant weldments without a crane or sling crew. On the giant turbine gear blank shown the welder welds all sides and internal angles down-hand—just pushes buttons to tilt the blank up to 135° beyond horizontal or rotate it 360°, under variable speed control to make the endless peripheral welds. So it is thruout many shipyards, welders with C-F POSITIONERS are building parts and sub-assemblies which would require many more hours of labor, highly skilled men and machine tools to produce by other methods.

Write for Bulletin WP 22.

C-F POSITIONERS *help build ships for Victory*



CULLEN-FRIESTEDT CO.,
1321 S. KILBOURN AVE. CHICAGO, ILLINOIS



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Serving With Our Armed Forces!

They served in 1898. They served in 1917—and they were among the first to be enlisted in the present global war.

Steel and Brass Hexagon Head Cap Screws, Case Hardened Square Head and Headless Set Screws, Steel Taper Pins and Studs are just a part of the Chicago Screw "QUALITY" line of Stock Products helping our men win the War!

and - -

They're Hard! They're Tough! They're Strong! They're Accurate!

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Order from your distributor

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THE CHICAGO SCREW CO.

ESTABLISHED 1872

1026 So. HOMAN AVENUE CHICAGO, ILL.

CRANES

The extent to which cranes of various kinds are useful in a given machine shop depends a great deal on the weight of the workpieces customarily handled, and to some degree on what other material handling facilities are available or in use. In most shops, some sort of small crane will be found applicable here and there. In a great many plants they will be found already in operation.

Large bridge cranes will be found in only an occasional shop. Small bridge cranes, controled from the floor, will be found more often, installed in some convenient bay in the plant,

If not a bridge crane, one may find an occasional jib crane on the job. Jib cranes, fitted with a swinging bracket arm on which a hoist is mounted with horizontal travel, serve the full area falling within the swinging radius of the arm. They are convenient for serving machines, as well as for ordinary materials handling. Some jib cranes are of wall type, in which case they serve a semi-circular area. Others are of pillar type, placed in the open, and serve a full circle.

It is possible to locate a number of jib cranes over a shop so that they will serve the entire area. This is done occasionally, especially in plants where a great many weldments are handled.

Truck and tractor-type cranes which operate in crowded quarters with low headroom, are found very convenient in a good many shops. These cranes can travel with the load suspended on the hook, and maneuver into practically any position.

There are also portable shop cranes, which can be pushed from one place to another by hand. With their help one man can lift heavy loads in servicing machines. They can be taken readily into parts of a shop where no other equipment can go. Late portables are fitted with safety friction load brakes, that hold loads at any point.

To build a shop crane into a power-type shop lift truck might seem like a very big order, but it has been done.

PRECISION GROUND SEMI-STEEL BENCH PLATES



IT'S A CHALLENGE!

● Here's the Bench Plate to consider where inspection and assembly of small parts is required.

Precision Ground of special semi-steel these wear resistant Bench Plates are designed to provide rigidity and will retain accuracy under constant use.

On the assembly line their smooth, solid working surface helps materially to maintain set production speeds.

Made in 2, 4 and 6-inch thickness. Sizes up to 36x96-inches are available either precision ground or planer finished. Larger sizes planer finish only.

THE CHALLENGE MACHINERY COMPANY

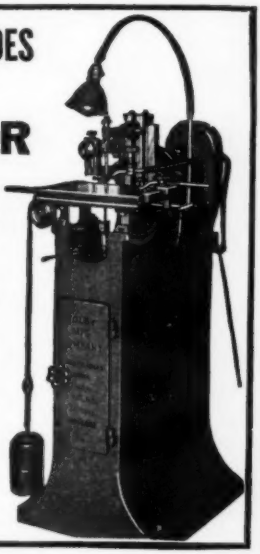
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449

The **ONLY** Machine Using **HIGH SPEED BLADES**

for High Carbon High Chrome Steel up to 3 Inches Thick

FOLEY DIE MAKER



Handles most intricate dies with small holes and sharp corners, as only smallest lead hole through which saw or file can pass is necessary. Compound angle filing is fast, accurate and easy with the Foley Die-Making Machine. Adjustable table tilts 20° front, 10° back. Ram tilts 20° right or left. Has 6½" throat—saws to center of 12¾" piece.

USES ANY STANDARD OR SPECIAL FILES—From the smallest needle file to the coarsest bastard file can be used in this machine without any special holding fixtures.

TAKES ANY SAW—Any type of saw from the finest saw to the high power high speed saw can be used without delay of changing holding fixtures. No holes in blade necessary.

PAYS FOR ITSELF—The Foley Die-Making Machine usually pays for itself in 400 working hours. Write today for literature and full details.

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Manufacturers of Foley Automatic Saw Filers, Grinders, etc.



SAVE TIME • MANPOWER • EXPENSE

9 FEDERAL SIZES

FEDERAL Open-Back, Inclinable Presses are available in nine sizes, with capacities ranging from six to 80 tons — either flywheel or geared type. They are the products of 40 years' experience in press building.

Standard Federal Presses are now producing scores of war items which formerly would have required special machinery. Machine gun belt links, for example, are turned out at high speed and low cost on standard Federal Presses equipped with a roll feed and automatic stop. This sensitive stop was developed by Federal to give intricate dies protection in case stock is fed improperly. It stops the press at the top of a stroke whenever work is not in exact position. If you have specialized press work problems, perhaps a standard Federal Press would serve. Write today!

THE FEDERAL PRESS CO.
806 Division Street, Elkhart, Indiana

HYDRAULIC PUMPS

Various hydraulic pumps have been devised for use with machine operation. Some are constant-displacement pumps, delivering constant volume. Others have variable displacement, controllable at the will of the operator.

Variable-displacement pumps have advantage in that speed of machine element actuation can be varied by the pump itself. They also avoid use, in many cases, of auxiliary equipment, hydraulic accumulators, relief valves, etc. In designing a hydraulic pump into a machine, it is wise to call a hydraulic pump manufacturer into conference. He has wide experience determining advantages and limitations of different types.

Gear pumps are highly favored for hydraulic machine actuation, especially where a unit of relatively low cost is desirable. Not all gear pumps are alike. Some use spur gears while others use helical and some use herringbone. The purpose in the latter case is chiefly to avoid end thrust, but also in some measure to eliminate pulsations and noise in the pumping action.

Quiet running is also enhanced by using one gear of bronze to run with one of steel. In general, two gears are the only moving parts in a gear pump. The pair of gears is enclosed in housing in such manner, and so related to inlet and out let ports, as to form the pumping unit.

In some pump designs, an internal gear is used, with a spur gear idler running inside of it. A great variety of gears and gear setups has been used by various manufacturers of gear pumps. Practically all are good.

For variable delivery, however, gear pumps are not often used. They are usually of constant-displacement type. A vane-type mechanism may be arranged quite readily for either constant or variable delivery.

Note: Machines described identified on request. Ed.

BALDOR
BALL BEARING GRINDERS for every Grinding Job





AT LEFT: Special Carbide Tool Grinder. ½ h.p. ball-bearing motor. **$95.00.**
AT RIGHT: BALDOR Pedestal Grinder No. 121; 2 h.p. 12"x2¼" wheels. **$205.60.**

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CUT SHEET METAL EASIER...QUICKER!

BIG CAPACITY

Cuts 14-gauge sheet steel or 16-gauge stainless

Save time and do better cutting of sheet metal by using this powerful, fast-cutting hand shears. Cuts 6½ feet of 14-gauge sheet steel per minute. Easy to guide around small curves as well as along straight lines. Light to handle, but sturdily built to stand hard service. Alloy steel cutters. Ball bearing, "Grip" type Universal motor, ⅛ horse power. Operates on either AC or DC and 110 or 220 volts, 25 to 60 cycles. Fuse protection incorporated in fuse box.

WRITE FOR LITERATURE

Now Available for War Production!

Jefferson Engineering & Mfg. Co.
269 Walker **Detroit, Mich.**



STUD SETTING

Setting of studs, or their occasional removal, is not the same job in all places, for in one place it will have more of a production aspect than it will in others, and will call for the use of faster method if it be possible to find one.

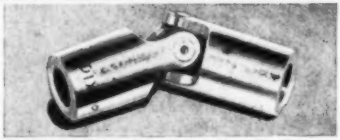
Where studs are hand-set, one of the best tools that has been noticed for the purpose has a sort of roller-type grip which tightens on the body of the stud as the tool is put into use. There is a pair of extended handles to give the necessary purchase for setting the studs up tightly, and the tool will grip as little as ½" of the unthreaded part.

Self-opening stud setters, which engage the stud by the threading, drive it, and open to release it when it has been set to a predetermined degree of tightness, have been used and favored by many. Many have used modern self-opening stud setters in places where there was plenty of room, but hesitated to consider them as being applicable to the setting of studs in tight places. However, it is a fact that this type of tool, as made by some builders, has been successfully used under various extraordinary conditions. One should not decide that they are not usable in a given place until he has checked into the matter carefully.

Did you ever hear of using a stud in the manner of a self-tapping screw, which threads its own hole as it is being driven? In order to do this, the material into which the stud is set must be relatively soft. But it is a fact that this operation has been handled quite successfully, in setting ¼" threaded studs into untapped holes of die cast automobile radiator grilles. The job was done with a self-opening stud setter, especially adapted for use in connection with a well-known power screwdriving machine. The rate attained was 30 studs per minute or better. Such a production record speaks for itself.

High production rates and self-opening stud setters notwithstanding, it is true that there are some tight places encountered now and then, in which studs must be set, that present a real problem.

If you meet with it, have a few hand type stud-setting wrenches at hand.



DIX Universal Joints

Precision made in 15 standard sizes, or to customers specifications. Write, wire for detail data.

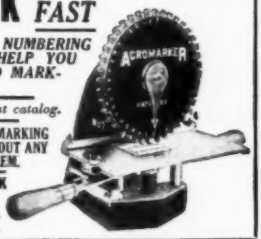
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HURON ALL STEEL GAGE HANDLES

TAPER-LOCK and TRI-LOCK



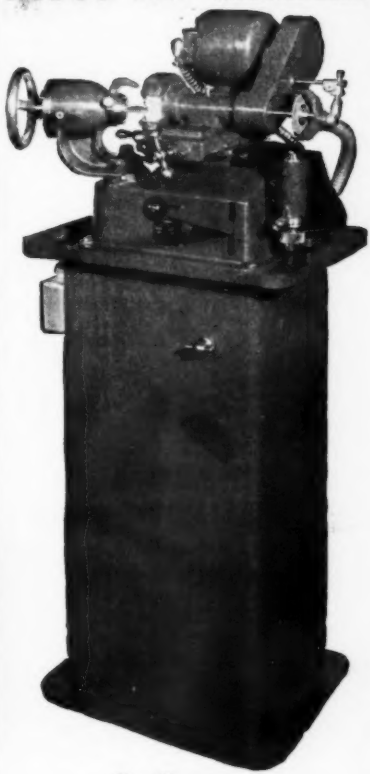
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HYBCO TAP GRINDERS



For Sharpening

CHAMFER - FLUTES - SPIRAL POINTS

CAPACITIES:

Machine Screws to 1½" hand taps.

Can be arranged for any number of flutes —right or left hand.

ALL TAPS HELD BY SHANK.

Can be sharpened after center is destroyed.

Write for catalog—and send us your problem.

HENRY P. BOGGIS & CO.
1279 W. 3rd St. Cleveland, Ohio

AN AMAZING

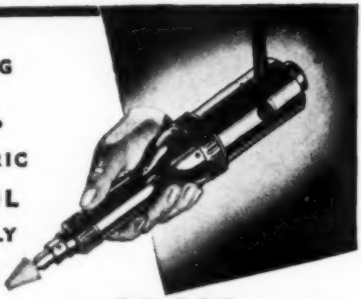
1/6 H.P.

IN AN ELECTRIC

HANDTOOL

WEIGHING ONLY

35 OZ.



SPEEDS *UNDER LOAD* TO 35,000 R.P.M.

USE IT WITH OR WITHOUT ATTACHABLE COOLFLEX SHAFT

Use PRECISE 35 for grinding, milling, drilling, sharpening, deburring, finishing, and a hundred other ways. Use it on steel of all characteristics, non-ferrous metals up to 350 Brinell hardness, aluminum, plastics and other materials.

Works faster and smoother because PRECISE 35 packs *more power and speed per oz. of weight than any other electric handtool!* Less operating pressure reduces frictional heat—saves wear on cutting tools by as much as 50%. No heating of tool or surface *and guaranteed shockproof without ground wire.* Operates on AC or DC and mounts in stand, vise, or lathe.

Strong, lightweight Bakelite case fits the hand—women hold it long hours without fatigue. Four ball bearings in balanced alignment are sealed in protecting grease chamber. Patented overload switch cuts off current when tool is abused.

For close and difficult work attachable COOLFLEX flexible shaft extends full power and speed of PRECISE 35 to cool-running handpiece weighing only 9 oz. Only PRECISE 35 offers attachable flexible shaft running at 35,000 R.P.M.

WRITE FOR BULLETIN NO. 67

PRECISE PRODUCTS COMPANY

717 RACINE STREET, RACINE, WISCONSIN

THE PRECISE 35

ROOSEVELT LAUDS WORKERS

The "Work Pledge For Victory" which was signed by each of the 656 employees of the Narragansett Machine Company, a war production plant of Pawtucket, R. I., was described by President Roosevelt as "an example of patriotic effort that, if widely followed, would have a very great effect on the success of the war program.

This was announced today by Mr. Robert A. Hurley, former Governor of Connecticut and Vice President of the company, who released the contents of a letter sent to him by Marvin H. McIntyre, Secretary to the President.

The full text of the White House letter to Mr. Hurley follows:

"The President received your telegram of March thirty-first concerning the action taken by the six hundrer and fifty-six workers of the Narragansett Machine Company.

"He has directed me to ask you to convey to these workers his sincere appreciation of their loyal pledge to avoid all unnecessary absenteeism.

"He feels that this is an example of patriotic effort that, if widely followed, would have a very great effect on the success of the war program."

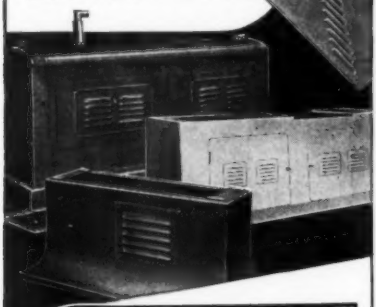
The "Work Pledge For Victry", newest move in the drive against absenteeism, was voluntarily signed by each employee of the company. It read in part as follows:

"Because I understand that each hour lost in production delays our eventual and inevitable victory, I, together with all my fellow workers of the Narragansett Machine Company, do solemnly pledge to devote my fullest energies and interests to my job and to refrain from being absent from my regular post at work except for reasons beyond my control."

Importance of combating absenteeism cannot be overestimated, relative to its significance to the Victory effort.

LOUVERS

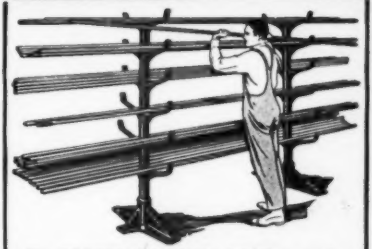
Louvers for machine bases, motor covers, etc. are fabricated from plate and sheet steel in our modern plant. Send blueprints for prices.



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SAVES TIME
IN YOUR STOCK ROOM



The BROWN SECTIONAL RACK saves the time wasted end-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

SEND FOR BULLETIN 26-B

BROWN ENGINEERING CO. 126 N. THIRD ST. READING PA

Anderson

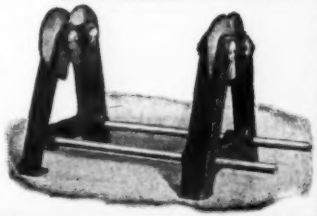
BALANCING WAYS

Shops handling rotating parts find this simple, sturdy and thoroughly dependable device highly efficient for balancing and truing operations. It assures better work . . . save times . . . saves labor.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a quick, accurate indication of whether or not the work is in perfect balance.

Write for complete details.

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



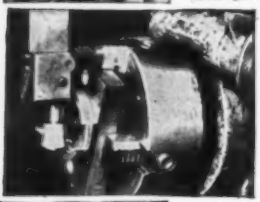
ANDERSON BROS. MFG. CO.
1917 KISHWAUKEE ST., ROCKFORD, ILL.



4 of the many ways . . . SLOTMASTER can be used to save TOOLS & SET-UPS

Left: Set-up for lapping deep impression die.

Below: Set-up for cutting an internal gear



SLOTMASTER can be used on any round or flat-on round over-arm milling machine and will do precision work that normally requires a multi-thousand dollar machine (all of the working parts are of tool steel, heat treated). It takes but little time to change over from one head to the other . . the stroke of the ram is adjustable from 0 to 4" . . the speeds range from 50 to 250 s.p.m. The tool holder is of the clapper box type and can be turned in any position . . SLOTMASTER comes complete with pulleys, motor, mounting bracket, etc. Send for 4-page catalog—give specifications of the milling machines you wish to equip. Immediate deliveries on high priorities.

Experimental Tool & Die Co.

12507 Greiner Detroit, Michigan





Below: Conventional set-up on a round over-arm milling machine; thumbnail shows set-up for cutting a spline.

STATUS OF MATERIALS

Giving a comprehensive picture of the current status of materials used in war and essential civilian production, Issue No. 8 of the Material Substitutions and Supply List was released April 22 by WPB. List is designed to guide industry in the conservation of more critical materials through substitution of less critical and non-critical materials.

Ranked on the basis of necessity and availability, more than 500 materials are arranged in the following three groups: 1—Materials which are INSUFFICIENT in supply either for war demands alone or for war plus essential civilian demands. 2—Materials which are SUFFICIENT for war and essential civilian production. 3—Materials available in sufficient quantity for use as SUBSTITUTES for the more critical materials in Groups I and II.

Present and anticipated trends in production are reflected in the changed positions of several materials in the new listing. For instance, the mounting importance of the food situation has created a new grouping of Insecticides and Fungicides some of which previously had been listed under Chemicals or Miscellaneous Products.

Softwood box lumbers and treated papers have been affected by the increased demands for overseas shipping containers. Secondary grades of lumber are now actually more critical than some primary grades. The treated papers—laminated asphalt, glassine, greaseproof and vegetable parchment, formerly listed in Group 3, are becoming more critical and now appear in Group 2.

Of the non-ferrous metals, bismuth, cadmium, and tin have become relatively more tight. In the ferrous group, the classifications remain about the same.

In urging greater use of the Material Substitutions and Supply List, Howard Coonley, Director of the Conservation Division, said, "American industry today is making progress on a three-way conservation program".

T. H. L. FRONT LEVER

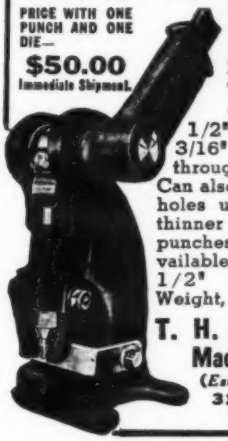
BENCH PUNCH

Built for hard, tough work—die cannot lose alignment with punch — all parts interchangeable.

PRICE WITH ONE PUNCH AND ONE DIE—

$50.00

Immediate Shipment.



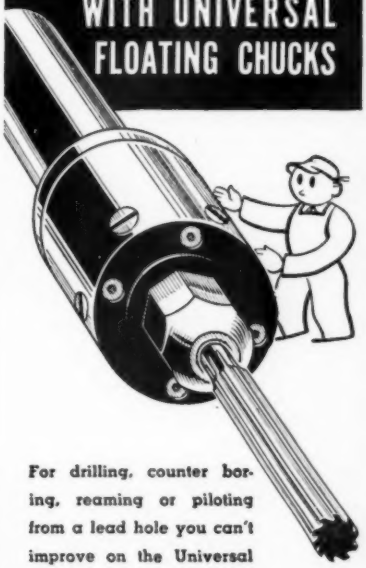
Capacity — 1/2" holes through 3/16" steel; 13/32" through 1/4" steel. Can also be made for holes up to 7/8" in thinner metal. Stock punches and dies available from 1/16" to 1/2" by 64ths. Weight, 70 lbs.

T. H. Lewthwaite Machine Co.

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PREVENT SCORED HOLES WITH UNIVERSAL FLOATING CHUCKS



For drilling, counter boring, reaming or piloting from a lead hole you can't improve on the Universal Floating Chuck. Adjustable spring pressure compensates for tool weight allowing increased feed without danger of marred holes. Designed for horizontal operation in screw machines and turret lathes. Write for facts on Universal Floating Chucks, Standard Chucks and Centering Chucks.

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STEADY PRODUCTION

Dependable diamond tools are vital in present production schedules. Every day more users are turning to Criterion Diamond Tools for the kind of service which they must have. Quality of diamonds used plus a unique method of setting assures extreme rigidity and extra tool life. Special tools made to order following blueprints or specifications. Sharp-pointed, selected thread grinding tools. Order direct. Request literature.

CRITERION

MACHINE WORKS

BEVERLY HILLS, CALIFORNIA

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Personal attention to your orders for Taps by the Threadwell distributors can often save days of waiting Threadwell HIGH SPEED Taps can be identified by the dot on the shank (red for cut thread, white for commercial ground, and blue for precision ground). They can also be identified by their OUTSTANDING performance on your production line. Threadwell Tap and Die Co., Greenfield, Mass., U. S. A.

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Threadwell
"TAPS OF DISTINCTION"

Curtice described the development of steel shell cases as "one of the toughest jobs in the history of military production" and as "one of the most critical assignments" his company has had in view of the need for conserving copper. He said that the process had been worked out thru close cooperation between Buick metal working technicians and the army ordnance steel shell case committee, representing a large section of the American metal working industry.

"The Buick process," said Curtice, "is one of several developed by the ordnance committee and involves extrusion and cold working of the bar stock steel, drawing it into the size and shape of a 75 millimeter artillery shell case and providing it with the high physical properties required in firing. It has been made available to the government for use by other manufacturers without license and is in use in production of other shell sizes."

Curtice said that the metallurgical and production aspects of the process made a difficult manufacturing job because there is virtually no permissible tolerance in the physical properties of the steel shell case. If it is too hard or brittle it will crack when fired, and if it is too soft the explosion pressure will cause it to stick in the gun barrel.

To meet the need, Buick devised means of availing itself of machines on hand.

CONVERSION

Machines formerly used for making automobiles now are producing shell cases in large quantities, Harlow H. Curtice, vice president of the General Motors corporation and general manager of the Buick division, said today.

Large presses once used to stamp automobile fenders and hoods out of steel are now working hard for Victory. They convert the same kind of metal into 75 mm. shell cases, which themselves are a military innovation in that they are made of steel instead of brass.

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CLAMPS

For Every Purpose

Individually tested for strength and freedom from flaws, assuring longer service. Preferred by industry since 1879.

FORGED STEEL
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WELDERS









In sizes from ¾" to 10' opening. ½" to 16" deep.

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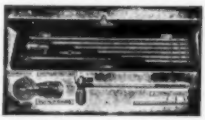


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PRECISION TAPPER

Taps guided by precision leads. Class 3 & 4 specifications easily met. 4 speeds. Ball bearings throughout. Available as floor model (with coolant system) or table model.

International Inside Micrometers

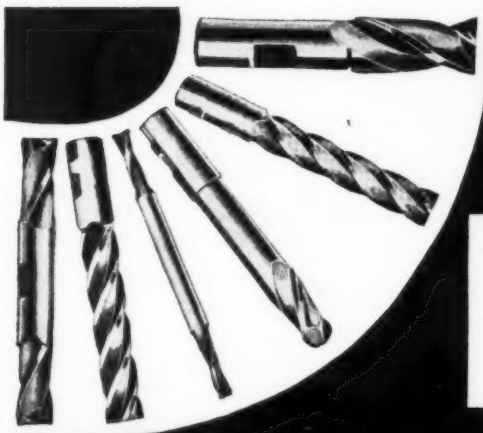
Highest accuracy and finest workmanship. Available 1½"—6" & 1½"—12" sets.



Brand Telescope Gauges ½"—2⅛"
Handy Knurler, used like pair of pliers.

BRAND TOOL & SUPPLY CO.

344 No. Vermont Ave., Los Angeles, Cal.



Shear Cut—
High Speed

END MILLS

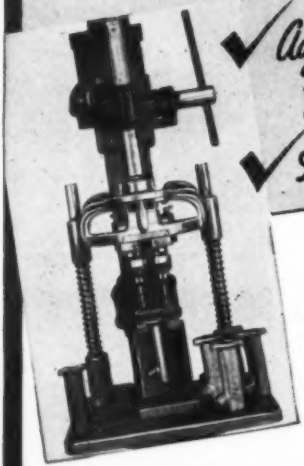
Shear Cut End Mills are offered in all standard sizes, single and double end.

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PROGRESSIVE TOOL & CUTTER CO.

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TWO SPINDLE
Adjustable
DRILL HEADS
Drill Two Holes At Once



✓ *Adjustable Centers from ½" to 6"*

✓ *Drill Capacity 0 to 5/8"*

Sleeve and overarm types . . . in several sizes. Will double output of any single spindle drill press.

Quickly adjusted to desired drill centers from ½" to 6".

Send for bulletin.

LINDERME MACHINE & TOOL CO., INC.

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SAFETY

War and industrial accidents tend to form a vicious cycle. When there is overnight expansion and conversion, combined with shortage of experienced labor, accidents are in the making. Yet the record shows that the accident rate need not necessarily rise. Numerous large plants with well-established safety programs have converted and expanded with no increase in accident frequency. Some have effected a decrease.

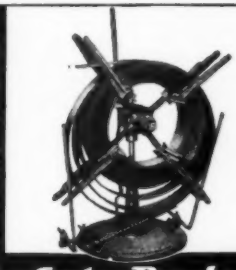
Several plants have reported that "dangerous operations" seldom result in accidents. Plain common sense, good housekeeping and the use of a few safeguards can cut accidents by half.

But the best safeguards are useless if workmen are ignorant of, or indifferent to, safety rules. In plants with low accident rates no new workman is left alone on the job until he has demonstrated awareness of every hazard he may encounter. "Green" men are simply ignorant, but some old-timers are worse because of stubborn adherence to bad habits. Particularly frustrating to safety engineers is the workman's resistance to protective devices. Sand blasters, for example, who refuse to wear air-conditioned helmets because they interfere with chewing tobacco.

There are various techniques of education, in addition to the simple safety talk. In one plant the foreman approaches a goggleless worker and quietly places a glass eye on the bench beside him, remarking that it is a nice color match and he doubtless will need it soon. A similar stratagem, with the use of a wig, is effective with wind-blown females.

Education succeeds best when employees participate in the program. Being closest to the jobs they contribute some of the smartest ideas for improvement, such as the woman worker who devised a starched visor cap that was both protective and flattering.

LITTELL REELS



for faster Production

LITTELL Automatic Centering Reels are constructed with four arms which operate all at the same time. A free loop of material is supplied to automatic feed, regardless of weight of coil.

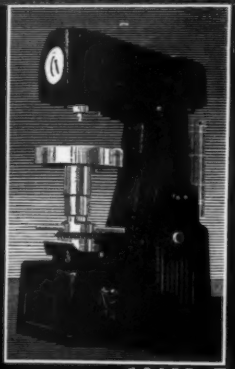
Littell Reels are made in 100-lb. to 20,000-lb. capacities. Automatic spindle and cradle types. Plain and motor-driven. Used in thousands of plants for faster production.

Other Littell products include Roll Feeds, Dial Feeds, Magazine Feeds, Air Valves, Straighteners, Scrap Winders, Pres-Vac Safety Feeders, Mechanical Pickers, etc. *REQUEST BULLETINS.*

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ROCKWELL IS OUR TRADE MARK FOR HARDNESS TESTERS

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PRECISION · SPEED · ADAPTABILITY



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OF FINE PRODUCTION TOOLS USED FOR SMALL ARMS AMMUNITION AND AVIATION INSTRUMENTS.

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DESIGNERS AND BUILDERS OF
PUNCHES - DIES - JIGS - FIXTURES - SPECIAL MACHINES



DIVIDING HEADS

As time goes on, and mechanics in general become more and more appreciative of the possibilities of a good dividing head at the milling machine, the grinder or other locations, dividing heads available become better and better adapted for wide variety of work. In some cases, too, the price required for a good dividing head is surprisingly low, considering the accuracy built into it. One recently noted, having a headstock that can be swiveled to an angle when desired, has tapered bearings for the headstock spindle. The worm is made from special alloy steel, with provision for taking its end thrust on ball bearings. Means are provided for making adjustment of the worm wheel easily and accurately. The worm wheel is of large diameter, and of 40:1 ratio, securely mounted.

One highly useful dividing head designed for milling machine use has a swiveling adjustment for the headstock reaching through a 100- degree arc. It is possible to swivel it from a tilt position 5 degrees below horizontal to 5 degrees past the perpendicular.

This head too, has a worm wheel of 40:1 ratio, keyed to the headstock spindle. The spindle is provided with a take-up collar for end thrust. Like the dividing head mentioned above, this one will divide all numbers to 50, and all even numbers to 100, excepting 96 T.

There is one set of universal index centers which has a still greater swiveling span for the headstock, the head swiveling and locking anywhere from 10 degrees below horizontal to a position 10 degrees past perpendicular, a full arc of 110 degrees. The layout has the same dividing capacity, through three index plates furnished with it, as the other index heads mentioned.

Aside from the possibilities of plain indexing as obtained with the equipment described, there are some manufacturers who offer all the possibilities of so-called differential indexing.

(Note: Machines described identified on request. Ed.)

DIAMOND WHEELS

In the use of diamond wheels, it is well to remember that wheels made up with thicker diamond sections will always prove more economical. Firms having considerable use for diamond wheels save money by purchasing them. They can be obtained with diamond sections as thin as 1/32", as thick as ¼", or eight times as thick. It is obvious that it is far more costly to purchase eight wheels in order to obtain the same amount of actual diamond section.

Diamond wheels are obtainable from manufacturers of grinding wheels, with the diamond section on the periphery. Others may be had with diamond section on the side of a modified cup-type wheel, for side grinding. At least, there is one large wheel manufacturer who makes both types. They are highly useful for sharpening tungsten carbide tools.

Results are even more satisfactory if one is sure to use a good diamond-lapping lubricant. Longer life is realized from tungsten carbide tools, if you give them best treatment when sharpening. Some lubricants developed for this purpose may be safely used on diamond wheels, whether they are metal-backed or have composition backing. There are different supply sources for oils that have been developed for use with diamond wheels.

Are you aware of the fact that diamond abrasive cutoff blades have been developed and put into use? They are made quite thin, much on the order of other abrasive cutoff wheels. But their chief field of advantageous use lies in cutting very hard, brittle materials rather than metals. Ceramics, tile, glass, porcelain and like materials are cut to good advantage with a wheel or circular blade of this kind.

By means of special bonding processes in manufacture, the diamonds are rigidly locked in the rim.

It protects them from crushing, and provides a fast-cutting action. In addition to the usefulness of diamond wheels for sharpening tungsten carbide tools, they are very handy on multi-bladed tools.





Patented—1-091-623 and 1-244-247

Use ½ H.P. at 38,000 RPM

You'll find exceptional power in the vibrationless Onsrud E-1 Air Turbine Portable Grinder shown here. Weighing only 5 lbs., it handles all kinds of heavy duty grinding. The E-1's high speed produces the finest kind of finish.

Do not overlook the time and money-saving possibilities of this and other Onsrud high speed portable tools. Write today for all the details.

ONSRUD MACHINE WORKS, Inc.

3908 Palmer Street **Chicago, Illinois**

Onsrud MACHINE TOOLS AND METHODS FOR TOMORROW'S PRODUCTION

RADAR

General Electric engineers and scientists as early as the twenties were actively engaged in the development of tubes, circuits, and apparatus for the high frequencies which form the basis for present-day radar—the electronic device which locates planes and ships far beyond man's former "vision", even in fog, darkness, and other adverse conditions—according to Dr. W.R.G. Baker, G-E vice president, in charge of the company's Electronics Department.

Army-Navy recently described the radar device in a joint statement:

"With such experience, added to manufacturing skill, General Electric was able to start building radars long before Pearl Harbor," Dr. Baker explains. "They are being made today in our factories for installations on ships and on the ground. Many of the same men and women who used to make broadcast station transmitters and home receivers are contributing this vital weapon.

The parts are being made in other factories by people who formerly made electrical parts for the home. General Electric is one of the large manufacturers of radar".

The United States has trained many thousands of men in the vital operation of radar, and will train many more thousands. Vital areas in the U.S. defense system have been equipped with the devices. Radar equipment is at work with our fighting forces on land, sea, and in the air.

In operation, radar sends out radio waves which are reflected back to sensitive receivers when a ship or plane enters the area which the radio waves cover. Returning waves are then plotted, and by a complicated system of calculations, officers determine the position, direction of travel, and speed of enemy planes or ships and then relay the information to interceptor forces.

Germany and the other Axis nations know about the device, but the Allies were the first to use and perfect its operation. It is credited with having helped save the British Isles from invasion after the fall of France.

The CRITERION Carbide Tool Grinder

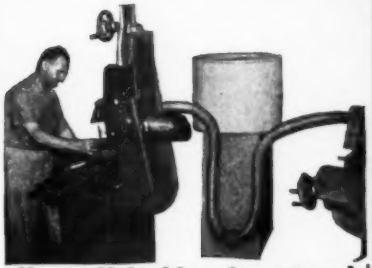
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Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P. balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 grit 7" dia. steel backed silicon carbide wheels. Ideal for metal bonded or Resinoid bonded diamond wheels.

Order from your dealer or write direct. Request literature. No obligation.

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BEVERLY HILLS, CALIFORNIA

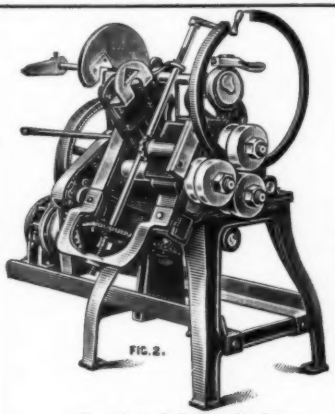


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Model 1250 DUSTKOP

for big-wheel Carbide Tool, Surface and Disc Grinders, Sanders, Cut-Offs—gets all the dust. Keeps valuable operators happy. Quickly installed. LOW priced. GE 1½ hp continuous duty motor sends dirty air through cyclone and filter; returns cleaned air to working space. Write for Bulletin A-100.

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No. 14 Angle Rolling Machine

ROLLS ANGLES, TEE IRON, PIPE, FLATS, ROUNDS AND SQUARES
CAPACITY—2"x2"x¼" ANGLE

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THAT HAS FOUND ITS WAY INTO
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used by Manufacturers of
SHIPS—PLANES—TANKS—AUTOMOBILES—ENGINES—FURNACES—FARM MACHINES AND METAL PRODUCTS OF ALL KINDS
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For Defense Production!



RUEMELIN Sand Blast Cabinets are very practical for cleaning all kinds of tools and parts after heat treatment. Quickly removes rust and scale. Cabinets are sanitary, furnished complete with dust control apparatus, permitting installation anywhere in the plant. No skilled labor required. Handles sand or steel abrasive. We also build a complete line of blast cleaning rooms, abrasive elevators, welding fume collectors, compressed air dryers. Write for descriptive bulletin.

RUEMELIN MFG. CO., 3980 No. Palmer St., Milwaukee, Wis.

RUEMELIN

HEAT-RESISTANT PLASTIC

A new formulation of "Lucite" molding powder to make plastic articles which will withstand much higher temperatures than those made from any commercial thermoplastic powder, was announced recently by Dr. G. M. Kuettel, Plastics Dept., E. I. du Pont de Nemours & Co., in an address before the Society of the Plastics Industry.

This special formulation, called high heat-resistant "Lucite" methyl methacrylate resin molding powder, is a war development of Du Pont's plastics research laboratories. It will be available for numerous peacetime uses.

Many articles molded from this new powder, Dr. Kuettel said, will not soften appreciably or distort when exposed to a temperature of 212°F., the boiling point of water. This is 30° to 40°F. above the useful temperatures for similar articles made from commercial thermoplastic molding powders.

Airplane flying-light lenses, dial and meter faces, medical and dental instruments, airport and railroad signal light lenses are among applications for which the plastic has been developed.

"Lucite" molding powders are prepared from the same basic materials as the cast sheets, quantities of which now are formed into the crystal-clear noses, gun turrets, navigation "blisters" and other transparent enclosures on military planes.

Dr. Kuettel said the high heat-resistant formula has approximately the same mechanical, optical, electrical and molding properties as the general-purpose "Lucite" powders.

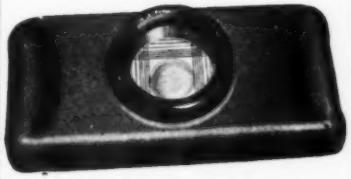
Most satisfactory compression results are obtained by using 20-50°F. higher mold temperatures than for general purpose "Lucite".

Good extrusion results are obtained with short screw and a speed of 5 rpm or less. Stock must be thoroughly dried. A moisture content not exceeding .02% is necessary for best extrusion results. Machine cylinder temperatures are from 30-50°F. higher than for general purpose "Lucite".

The new powder is made by Du Pont's Plastics Department at a New Jersey plant, and is shipped to molders.

(Note: Machines described identified on request. Ed.)

FELL PRECISION LEVEL



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005" per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes—5½"x12"; 3½"x6".

Write TODAY for bulletin giving full details.

Wm. B. FELL COMPANY
700 South St. Rockford, Ill.

A RADII & ANGLE DRESSER OF PRECISION AND VERSATILITY



An instrument of precision and versatility . . . Operation is simple requiring no high degree of skill for accuracy . . . Any one of the following can be produced with one setting:

One angle
Two angles
Concave radii up to 6"
Convex radii up to 4½"
Two Angles and radius.
Many other diversified forms to meet requirements.

Wheel size capacity—9" dia; angular travel 3"; for use on universal surface and cylindrical grinders.

Full details available on request.

MANUFACTURED BY
J & S. TOOL CO. 477 Main St., East Orange, N. J.
PRECISION DRESSING TOOLS



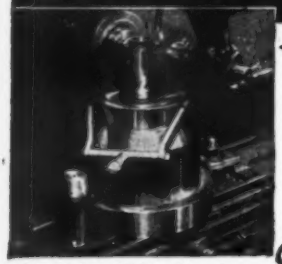
Write for Literature and Prices
19220 Glendale Ave.

ZAGAR INVITES YOU...

Have you perchance a small broaching job that simply will not yield gracefully to oversize broaching equipment? Please give us the details. Maybe we will be able to supply an answer with our . . . .

New ZAGAR HORIZONTAL BROACHING MACHINE

. . . . shortly to be announced. Meanwhile, *Zagar invites you* to lay your broaching problems before our engineering department.



←Milling spring slots in collet with 2" Zagar Indexing Fixture, indexing 3 times at 120°. Part held very rigid. Set-up extremely simple. Performance trouble-free. Job would run on U.S. hand mill. Production: 54 milled slots per hour when using tool steel.

Zagar Indexing and Holding Fixtures short-cut production, save time and make more money
Ask for our Bulletin "B-6"

COLLETS
In stock — Zagar No. 2 and No. 6 Collets, similar to W. & S. No. 2 and No. 6 Collets.

ZAGAR TOOL, INC.
23880 Lakeland Blvd. Cleveland, Ohio

DIE CASTING

While die castings are often made on contract by large die casting plants, the process is far enough advanced and widely enough accepted to warrant manufacturers having their own die casting machines. We find them at work by makers of electrical parts, hardware, household utilities, etc.

Machines are available in enough different models so that an investment, in keeping with the amount of castings to be made, can usually be arranged. One builder offers hand-operated models, that are semi-automatic, and others that are full automatic. Production is lowest on hand-operated machine, highest on the full-automatic. Naturally, price of the machine varies accordingly. Incidentally, the semi-automatic machine in this line is particularly economical to use with compressed air, using the same 100-lb of air for both injection and for plunger return.

Die casting machines that have been developed by pioneers in this line make a big showing producing castings, using multiple-cavity dies.

Think of a machine using 12-cavity dies, or producing 12 castings at a shot, consistently maintaining a three-shot-per-minute production rate! That is 36 pieces per minute, or well over 2,000 pieces per hour. This rate has been shown on machines built by a firm which has made especially good progress die-casting aluminum-base metals.

However, zinc-base alloys are also handled well in these machines.

The number of shots that can steadily be maintained per hour varies with size of the machine and die opening.

One builder makes a line of four different sizes. As many as 250 shots per hour can sometimes be reached with the smallest machine. 75 shots per hour are about top for the largest. On these machines, a so-called gooseneck is submerged in the molten metal and allowed to fill to a pre-determined level. It is hydraulically raised to the injection position, and at the same time, an air connection is brought automatically into position, ready for application of air.

(Note: machines described identified on request. Ed.)

SPEED UP TOOLING— CUT COSTS



with the
UNIVERSAL VISE

Save tooling time. Build your fixtures around a completely pre-designed drill jig body.

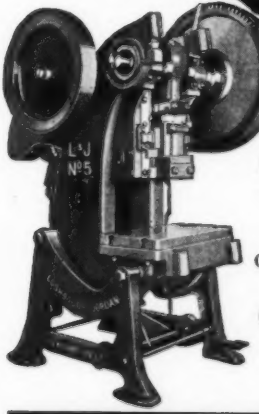
Save production costs. Savings up to 60% in drilling time not uncommon. Lever locks work instantly—holds securely. Throw it back and work is released. No complicated adjustments. Save cost of expensive drill fixtures—just a bushing plate and adaptor needed for each job.

Order today. Please include contract number or priority certificate. *Write for bulletin.*

Mohr Lino-Saw Co.
130 N. Union Ave. Chicago, Ill.

Standard Since 1911

L&J



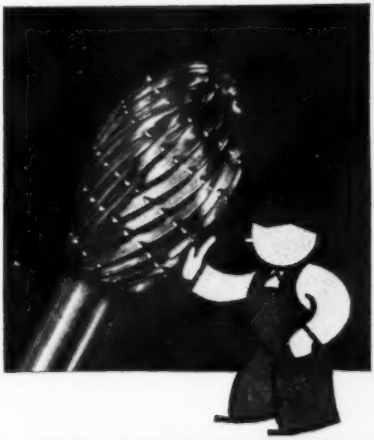
INCLINABLE POWER PRESSES

(5 to 49 ton)

NO. 5 BACK GEARED TYPE

Write for Literature

L & J PRESS CORP.
Successors to Lushbaugh-Jordan Tool & Machine Co.
1675 STERLING AVE ELKHART, INDIANA



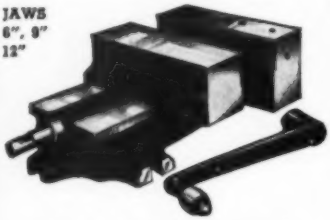
WE MAKE WORN TOOLS *Sharp!*

REGRINDING SERVICE SPEEDS UP ACTION OF ANY ROTARY TOOL

To get real production on the finishing of metal castings, dies or patterns, you need the kind of rotary tools that take deep sharp bites. Yeomans Tool Regrinding Service puts your worn tools back in top-notch shape — makes them sharp-toothed and hard biting. For prompt service and a good resharpening job on your Burrs, Die-Sinkers, Reamers, Drills, End Mills and Milling Cutters of any size, shape or quantity send them to:

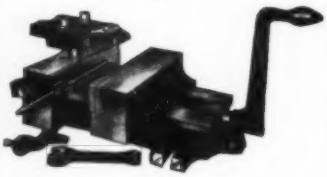
Yeomans
TOOL CO • 2703 Bay St., Saginaw, Mich.

JAWS
6", 9"
12"



Plain vise, drilled to receive Jig Attachments at any time.

GRAHAM MULTI-PURPOSE VISE



Same vise with Attachments

Made in sizes and weights suitable in scope for ordinary drilling to heavy planer and shaper work, the Graham Vise is a jack-of-all-trades in any busy shop. As a standard vise, its parallel, flush, and square construction makes it exceptionally reliable and easy to position. When equipped with the numerous Jig Attachments, the vise serves an endless variety of special holding requirements. It is particularly valuable in eliminating the need for making special jigs and fixtures for repeat-operation work. Attachments include: stops, V-jaws, shell jaws, single and multiple drill guide bushings.

Request Illustrated Price Circular.

GRAHAM MFG. CO.

51 Bridge St. East Greenwich, R. I.

TOOL OF MANY USES

Full power and speed of The Precise "35", 35-oz power tool (claimed to reach 35,000 rpm, developing 1/6 hp at full load) is now extended to a handy Coolflex flexible shaft attachment and handpiece, said to run cool, as well as to reduce the 35-oz weight to 9 oz. Developed by United Precision Products Corp., 717 Racine St., Racine, Wis., the tool is reported as lending itself to many purposes in a wide range of operations.



The handpiece, like the Precise 35, itself can accommodate tools with shanks up to ¼" diameter, mounted wheels up to 1¼" and milling cutters up to ⅜".

Folder issued by the firm illustrates wide range of applications and accessories with which tools can be provided. These include a tool post holder, by means of which the tool can be mounted in a vise for such operations as touching up button dies, etc, as well as for attachment to lathes. A suspension holder is also available, as are sets of mounted wheels, specially selected for high speed grinding and 20 ground milling cutters for high speed milling of non-ferrous metals.

Complete sets, containing the tool and all these accessories can be had, mounted in a handy, strong, finished wooden case.

CRATEX WHEELS BULLETIN

Cratex wheels, points, pencils, laps, etc., are compactly, yet practically detailed in



SAVE TIME AND WORRY

MARK PARTS, TOOLS, GAGES, DIES, FIXTURES, OR HARD FERROUS METAL & ALLOYS

THIS

3000 Echograph **IN USE**

WAY

3 Sizes to Meet All Requirements

Send for Circulars and Prices

BREWSTER-SQUIRES CO. 42 Church St. New York



STEELGRIP BELT LACING

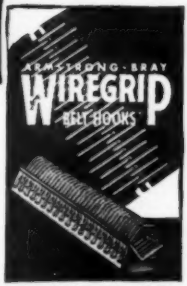
A strong lacing for all types of belts. Put on with a hammer in a few minutes. Clinches smoothly into belt, compresses ends, prevents fraying. 2-piece hinged rocker pins provided. 8 sizes. In boxes, handy packages, cartons and long lengths.

Write for catalog sheets.

BELT LACING

Both types from 1 source

BELT HOOKS come with blue aligning cards that prevent waste—every hook can be used. Protects fingers. Applied with a WIREGRIP or any other standard Belt Lacing Machine. 6 sizes.



ARMSTRONG-BRAY & CO.

"The Belt Lacing People"

5364 Northwest Highway Chicago, U.S.A.



SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table swivels and locks in any position. Can be varied 15½" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO.

112 Webster St., Dayton, Ohio



GOOD NEWS!

for DIE MAKERS

Transfer Points Eliminate Guesswork in Die Making

There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in ¼" to 1" diameters.

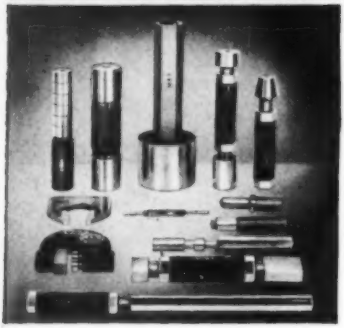
3/16"	$1.50 per set	5/16"	$1.25 per set	7/16"	$1.40 per set
1/4"	1.20 " "	3/8"	1.35 " "	1/2"	1.50 " "

HEIMANN MFG. CO., URBANA, OHIO

HUNDREDS OF GAUGES

STANDARD PLAIN
CYLINDRICAL PLUG BLANKS
Prepared for final finish
Waiting for your orders

SEVEN DAYS DELIVERY



ALSO OTHER TYPES OF GAUGES
PLUG:
Taper, Square, Progressive, Wire, Flush Pin, etc., etc.
SNAP:
Solid Flat, Built-Up and Adjustable Limit, Mod. "A" and "C"
All made to Standards or Drawings

ORDINARY OR HARD CHROMIUM PLATED
REASONABLE DELIVERY

MIDDLESEX
GAUGE AND TOOL CORPORATION
526 W. 48th Street, New York, New York
Hard Chromium Plate Salvaging of Worn Plug Gauges Saves Steel, Machining and Men—Let us refurbish them for you
QUOTATIONS AND LITERATURE ON REQUEST

its latest release by Cratex Mfg. Co., 81 Natoma St., Los Angeles. Firm's specialty, Cratex, is a rubberized abrasive-polishing compound...rubber, abrasive grains and polishing compound...formed into a wide variety of wheels, points and other tools, tempered for greatest wear and serviceability. The abrasive is made in 6 types, depending on grades of fineness.

While wheels up to 8" diam. are listed, the concern stresses smaller tools, points, pencils and such, applicable to precision work on dies, molds, etc., in fine grinding and polishing. Its products are well known to specialty manufacturers, die casters, plastic mould-makers, dentists, and are said to have enjoyed widened application in war production.

DRILLS WITH PLASTIC HOUSINGS

Using a new plastic material called Drillite, Black & Decker, Towson, Md., has designed practical housings for the ¼" Standard Drill and the new ⅜" Standard Drill. Drillite is made with a shredded cotton duck base. It gives high impact resistance. The plastic is said to be heat resistant, and a perfect insulator against dielectric shock.



For long productive life, steel inserts have been cast into the plastic housings to carry all ball-bearings, and threaded steel inserts in field housing for assembly



PADDOCK
Ball Bearing
BANDSAW GUIDES

•

Reduce Blade Breakage

Increase Production

Easily adjusted to all sizes of blades to 1½" wide.

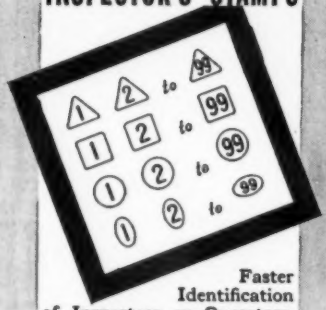
Recommended for new and old machines running at any speed cutting all materials.

Shipped on 10 day approval

PADDOCK TOOL CO.
1418 Walnut St., Kansas City, Mo.

New

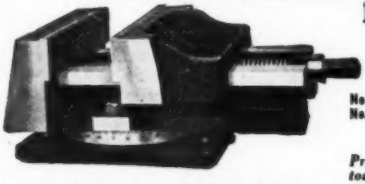
INSPECTOR'S STAMPS



Faster Identification of Inspectors or Operators. Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.

NEW METHOD STEEL STAMPS, Inc.
145 JOS. CAMPAU DETROIT, U. S. A.

SUPERIOR QUALITY AND WORKMANSHIP IN PLUNKET VISES



SQUARE BASE SHAPER VISE

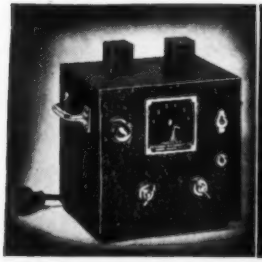
The Shaper Vise has graduated swivel base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

No. 48, 10" jaws, 2¼" deep, opens 8½". Weight 125 lbs.....$52.00
No. 4, 6" jaws, 1½" deep, opens 5". Weight 45 lbs.....$38.00

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers and Grinders.

Prices are net, f. o. b. Chicago. Write for illustrated folder today. Dealers inquiries solicited.

J.E. Plunket Machine Co. 1823 W. Lake St. Chicago, Illinois



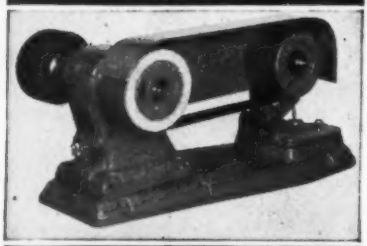
Red "E" DEMAGNETIZERS & ETCHERS FOR SPEED AND ECONOMY

A sturdy all around unit for any shop. Demagnetizes by throwing lower switch and passing work over magnetic poles at top of unit. Etching is controlled at upper switch with convenient six station selector to adjust depth of etch.

Red indicator light signals when unit is in operation. Rubber extension cord, plug, special alloy etching stylus with self cooling holder are included. *Write for folder giving details.*

GRINDING MACHINE CO.
2832 E. GRAND BLVD. DETROIT, MICH.

JONES BENCH GRINDER
and Polishing Machine No. 135



Gives You Faster, Better Finishes— At Lower Cost, Too!

The Jones Bench Grinder and Polishing Machine No. 135 finds unlimited use for deburring and polishing around the shop, or for production work on small parts. The new one-piece base eliminates any misalignment.

Check these Jones features: Can be used with any type 3/4 to 2 H.P. motor... Perfect belt tension and alignment.... Dustproof motor mounting.... Easy operation.

Write for Bulletin No. 135 today.

JONES ENGINEERING COMPANY
DEPT. B-3
ELLWOOD CITY, PENNSYLVANIA

screws. Steel air vents in commutator end housing provide ample motor ventilation. In addition to these marked advantages, use of plastic housings conserves critical aluminum.

Outstanding is marked reduction in weight of the complete unit, as compared with former models using metal housings.

SNIPS AUTOMATICALLY



Not only does this ingenious device do away with cumbersome sheet metal snipping on straight-edge jobs, but with it you can follow curves and prescribed patterns. For cutting out sections of plywood panels, too, you need but bore a ¼" hole and insert blade.

Said to be a remarkable time-saver for everyone who works with light metals, in aircraft and other industries, it fits the chuck of any ¼" pneumatic or electric drill, cutting sheet metals up to .040", leaving a smooth, workable edge, requiring no filing or grinding. It operates at twice drill-speed and removes less than ⅛" of material.

The makers, C-B Tools, Lancaster, Pa., state that the device is being used to advantage in many ways...directly in the drill, mounted at edge of bench, as a permanent metal-cutter, etc.

MODERN BELT DRIVES

"Handbook of Modern Mechanical Power Transmission for Industry", a graphic presentation of the most recent engineering procedure in designing and maintaining group drives for efficient power transmission, is offered by Cling Surface Co., 1048 Niagara St., Buffalo, N.Y.

Especially timely with the WPB urging industry to conserve electric motors and accessory equipment, the book points out simplicity of converting from individual to group drives, with consequent reduction in equipment needed.

A GIANT WORKER
SAVES THOUSANDS OF HOURS DAILY





GROB FILING MACHINE
"THE TOOLMAKERS BEST FRIEND"

INDISPENSABLE in every shop. It cuts with a continuous flow of chips and removes stock like a milling machine . . . . . FASTER PRODUCTION WITH HIGHER ACCURACY . . . . .

Write or wire for details and prices

GROB BROTHERS
GRAFTON WISCONSIN

Modernized . . .
Beautified . . .

Buffalo's Most Congenial Hotel

Today, you'll enjoy your stay at Hotel Lafayette more than ever! Extensively remodeled, and redecorated, this fine hotel offers new convenience and comfort—but the friendly hospitality is the same as ever. Excellent food, home-like rooms, reasonable prices. And remember: Hotel Lafayette is Buffalo's most centrally located hotel. Moderate rates: Single, $2.75 up; Double, $4.50 up; special rates for 4 or more.

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HOTEL LAFAYETTE
K. A. KELLY, Manager BUFFALO, N. Y.

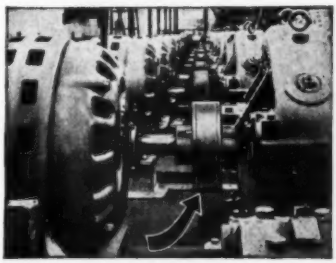
USE KANTI-LEVER COUPLINGS

THEY HELP YOU Maintain Peak Production

With your machines now forced to the limit to gain peak output, the necessity of stopping for repairs becomes much greater. You can prevent many of these costly interruptions of production by using KANTI-LEVER Couplings, for they have a scientifically designed Cushion Torque that absorbs sudden load shock and torsional vibration—the two main causes of wear fatigue and failure of machinery. The KANTI-LEVER is different from any other type and gives your machine a protection that is vitally needed under present abnormal conditions. See cut showing 70 KANTI-LEVERS that have proved invaluable to their user by protecting the driven machines and enabling steady production for over 18 years.

Send for Bulletin No. 28-B Describing

Kanti-Lever Couplings

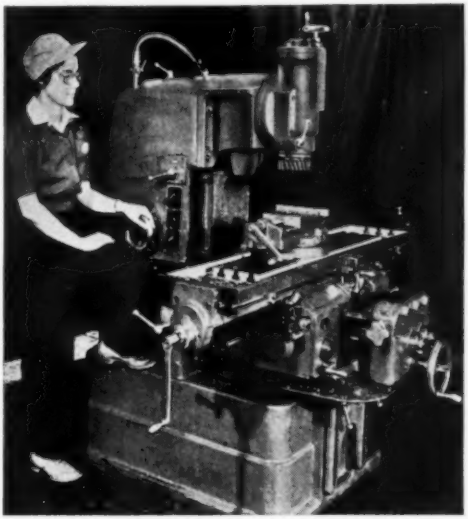


BROWN ENGINEERING CO., 126 N. THIRD ST. READING, PA.

LOMBARD "30-HV" MILLING MACHINE

Illustrated is the new Lombard Universal "30-HV" being used in its vertical capacity with a vise and bar set up. High, full power spindle speed is achieved by direct power gearing and double-pulley V-belts. Hinged vertical head swings into position from right of machine. The actual change from horizontal to vertical is achieved in just a few minutes by removing arbor support clamp and arbor and sliding double overarms into column. Vertical head tapered shank fits into the horizontal spindle and is held by draw bolt. Clamp bolts hold head rigidly to column. Control wheel at top of vertical head provides micrometer readings which facilitate set up and give instantaneous depth adjustment. In the picture, the young lady is setting spindle speed control before raising table to cutting position.

The machine is ruggedly constructed and designed for unusually heavy cuts. Rigidity is assured by the heavy ribbed



Immediate Delivery



WILSON FLOATING TOOL HOLDER

• Permits **instant alignment** of drill, tap or reamer in work. • Centered bushing blank furnished for direct mounting of tool in holder. • Three tapped holes in nose of tool prolong life. • Contacting surfaces precision ground, shank hardened and ground.



• EXCLUSIVE FEATURE — Spring action in nose bolts produces finer finish and increases production on all reaming operations. • SATISFACTION GUARANTEED.

Model	Diam. of hole for drill or bushing	Diam. of shank	Length of shank	Price with one bushing blank	Price of extra bushing blanks
00-W	1/2"	5/8"	1 1/8"	$6.25	$0.55
0-W	5/8"	3/4"	2"	7.00	.55
2-W	1"	1"	2 1/2"	8.00	.65



WILSON INDUSTRIES, INC.

551 West Lake Street Chicago, Illinois



"CHAMPION" Steel Racks

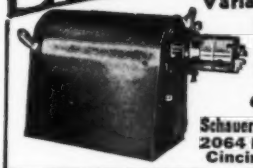
Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

The Western Tool & Mfg. Co.
Springfield, Ohio

SCHAUER Speed Lathes

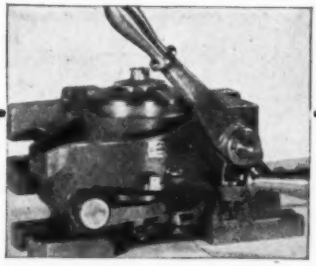
Variable Speed



Ideal for tapping filing, polishing small metal and plastic parts.

Write for Catalog 420.

Schauer Machine Co.
2064 Reading Rd.
Cincinnati, Ohio

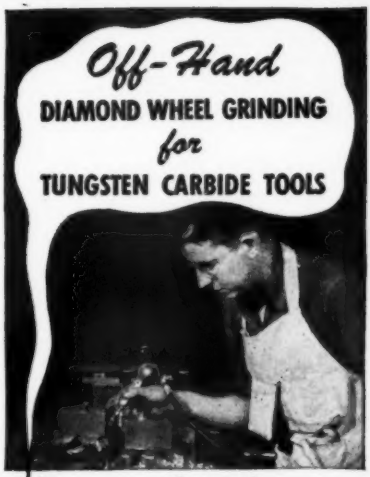


DEARBORN Automatic Chucking and Indexing Fixture

MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN
72 S. CLIFF ST. ANSONIA, CONN.





Another WAR-TIME SUGGESTION by Madison-Kipp

If you use Tungsten Carbide Tools you have probably had some rather troublesome tool upkeep problems. We have solved some of these problems in our own war production work by using Kipp Diamond Wheels in the Model H Kipp Air Grinder. Contrary to previously held ideas, it is entirely practical to diamond grind by hand. The Model H Grinder has a speed of 50,000 R.P.M. With this speed and Kipp Diamond Wheels, Tungsten Carbide tools can be ground right at the machine. The price of the Model H Kipp Air Grinder is $29.75 and the price of a 1/4 x 1/8 Kipp Diamond Wheel is $3.43.

Madison-Kipp Corporation,
207 Waubesa St., Madison, Wis.

Write for **AIR GRINDER** *Catalog*



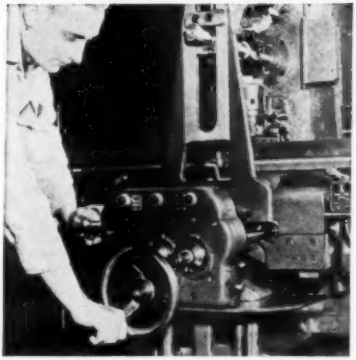
Model H
$29.75

KIPP air GRINDERS

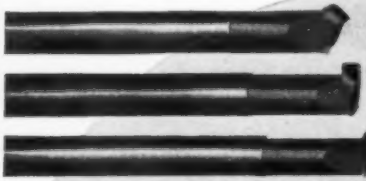
bed, joined to an extra strong, column head, with the entire column base, knee and saddle of heavy section block construction. Ways and gibs are carefully scraped. All spindles are heat treated, hardened and ground. Anti-friction bearings are used thruout the transmission.

A safety interlock prevents chance of injury by table cranks. A safety torque clip clutch prevents overloading on power rapid traverse.

Briefly, some of the salient features include a table equipped with six-direction power rapid traverse with 100" per minute in both longitudinal directions, 50" per minute on cross travel and 25" per minute elevating travel. The table is of one piece construction finished all the way around with three bolt slots and deep coolant return wells. A skip stop operation is provided for automatic table cycle as well as automatic spindle and coolant starting and stopping. Selection of entire automatic cycle is made easy. Dial equipped controls regulate speed ranges which are 30-1900 rpm, or 45-2850 rpm. Eighteen quick change gear ratios, giving 40-1 ratio, are supplied in geometric progression and can be conveniently changed



Operator, with his left hand is selecting the cross traverse, setting it either for Power, Hand or Rapid Traverse. With his right hand, he is ready to select the direction of travel. Lever on right of the control box is already selected for vertical or horizontal positions. Two starting buttons control horizontal, cross, and vertical travel after controls are set.



STYLE A
For general boring

STYLE B
For facing and bottoming

STYLE C
For internal threading

BUY WAR BONDS

BOKUM TOOLS *accept more feed — increase production*

Since the greatest cutting force is always directed toward its largest cross section, the Bokum Tool can accept more feed than ordinary boring tools; therefore, it completes the job faster.

Original form of tool is never changed through resharpening.

For complete description of these tools send for the catalog that meets your particular need.

For High Speed Steels, No. H-1139
For Carbide-Tipped, No. H-398

BOKUM TOOL CO.
14775 WILDEMERE AVE. • DETROIT, MICH.

WADE BENCH PROFILER



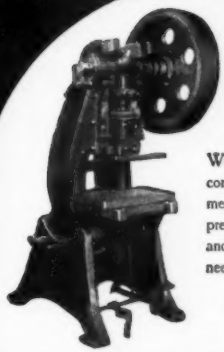
For rapid production in recessing and slotting operations.

WADE TOOL CO.

WALTHAM, MASS.

ALSO WADE BENCH LATHES AND HAND KNURLING TOOLS

RECLINABLE POWER PRESSES



We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

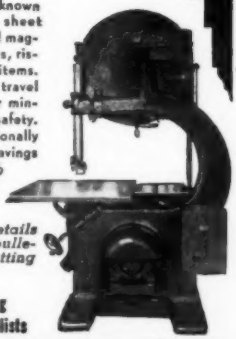
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Newark, New Jersey

TANNEWITZ *High Speed* METAL CUTTING BAND SAWS

Fatest and best known means of cutting sheet steel, aluminum and magnesium sprues, gates, risers, and kindred items. Provides saw blade travel of over 2 miles per minute with perfect safety. Cuts are exceptionally smooth. Labor savings ranging from 25% to 90% are the usual thing.



For complete details simply write for bulletin on metal cutting band saws.

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THE TANNEWITZ WORKS

GRAND RAPIDS, MICHIGAN

Geared For Victory

Gear Specialists

- **SPUR**
- **WORM**
- **BEVEL**
- **HELICAL**

The Taylor Machine Co.

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ADJUSTABLE SNAP GAGES IN STOCK Model A

Immediate delivery .025" to 4¼"

PROMPT DELIVERY ON PLUG GAGES .125" to 8"

Extraordinary Improvement in Adjustable Snap Gages with Ball-tipped anvil and amazing positive locking system cannot get out of set—Pat. Appl'd for.

GOOD GAGES — **Prevent Spoilage** — **Speed-Up Operations** — **Utilize Less Skilled Help** — **Reduce Costs**

EASTERN PRECISION GAGE CO.

HERSH TOWER BLDG., BROAD ST., ELIZABETH, N. J.

Phone, Elizabeth 2-9319





Operator's left hand is selecting the range of speed for spindle operation (set on Medium). With his right hand he chooses the exact rpm within the range selected. (In picture he is setting it for 73 rpm.) The low speed ranges are from 29 to 119 rpm while the medium ranges from 115 to 475 rpm and high speed ranges from 460 to 1900 rpm. Below the spindle range control are three control switches.

from ⅜-15", ½-20", ¾-30", or 1-40" per minute.

Vertical quill is hardened and fitted in a ground bore with pick-up screw and clamp. Quill is 4½" in diameter, 14" long and has 4" of power or hand feed as well as 360° of angular adjustment.

Giving high productive precision operation, the Lombard Universal is designed to meet present war production and future industrial needs. Its wide range of feeds and speeds, ease of job set-up and job control, quickness of change over, ruggedness and rigidity, make it a machine especially designed to turn out clean, accurate work. The 28" horizontal power feed, 10' cross power feed, and 4" vertical feed and the 12 x 53" work holding surface afford large dimensional capacity.

It is sold either as Horizontal or Vertical or as a Universal Machine by Lombard Governor Co., Ashland, Mass.

FAMCO ARBOR PRESSES *for Precision*

Speed on Production and Assembly Jobs

Exclusive adjustable gib assures perfect ram alignment. 32 stock sizes, floor and bench models. ½ to 15 tons pressure. Write for complete data.

FAMCO MACHINE COMPANY

1320—18th St., RACINE, WIS.



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Collect Grinder DUST with DUSTKOP!

Installs in a few minutes. Pulls dust away from grinding wheels and returns cleaned air to room. Complete, self-contained dust collecting system. DUSTKOP is operated by GE 1/4 hp. continuous duty motor, multiple blade fan. Compact, portable, low-priced.

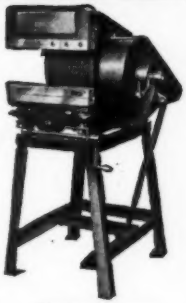
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Specially designed to meet the need for a small power-driven press brake for moderate-sized work. Capacity, 14 ga. iron, 72 strokes per minute. Ram and die shoes machined for standard ½" tongues. Powerful, extremely sturdy, fast, easy to adjust, accurate, with many practical features.

Write for new Whitney-JENSEN AIRCRAFT TOOLS CATALOG

WHITNEY METAL TOOL COMPANY
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HAMILTON
SWISS TYPE
GEAR HOBBERS

... for Accuracy and speed in hobbing PINIONS GEARS and SECTORS



TWO MODELS

No. 00 SPUR GEAR HOBBER (Illustrated) for work up to 2" diam.

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Manufactured by
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Stock dressers; special dressers, and resetting are sent 24 hours after receipt of order.

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GRINDING WHEEL DRESSERS • PHONOPOINTS • SHAPED TOOLS THREAD GRINDERS • DIAMOND POWDER

Set in Our Own PERM-ALLOY (Reg. App. for)

Expertly constructed diamond tools increase production and cut costs. With 91 years of "know how", Karelsen guarantees accurate, economical service. Submit sketch, blueprint, or specifications. Send for catalog 51.

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The HAMILTON MUEHLMATT Super Sensitive DRILLING MACHINE

Quickly set up . . automatically true . . used singly or in multiples . . and enable you to save the hard-to-get small drills.

Minute . . .

but perfectly precise . . .

Holes as small as .004 to 5/16" dia.

THE HAMILTON TOOL CO.
Ninth and Hanover Streets.
HAMILTON OHIO

ATLAS BUSHING CATALOG

Just released is a new 84-page catalog, listing sizes and prices of hundreds of Atlas finished bronze bushings and porous oil-retaining bearings.

Widely used in the aviation industry, these bearings and bushings find wide application in practically all phases of machine manufacturing.

The sizes and grades of Atlas bronze listed in this catalog are carried in stock ready for immediate shipment, according to the manufacturer. In addition, pattern equipment is available for hundreds of unusual sizes of cored and solid bars from which castings can be furnished on short notice to meet ASTM, SAE, Navy, Federal and any desired specifications.

Full instructions for ordering are contained in this catalog. Oil-retaining bronze bearings and oil impregnated hardwood bearings are also featured.

This catalog may be obtained free by writing Atlas Brass Foundry, 1901 Santa Fe Ave., Los Angeles, Cal.

7 ADVANTAGES
of the
TEMCO
Electric Furnace



1 Rugged one-piece body; snug fitting door.
2 Quality Nichrome heating element embedded in reinforced muffle—minimizes oxidation.
3 Heavy-duty switch, monel metal contacts; 3-range heat selection.
4 Rapid heating to max. temp. in but 30 min. Operates continuously to 1500° F.; intermittently to 1850° F.
5 Entire heating element used over full heating range and covers 4 sides of chamber—eliminates cold spots.
6 Accurate, dependable pyrometer calibrated in both Centigrade and Fahrenheit scales assures uniform results.
7 Low in cost; economical in operation.

$42.50 (115 Volts)

Ideal for heat-treating small metal parts and for testing and development. Heat chamber 4" wide, 3⅝" high, 3⅝" deep. Outside dimensions 9" wide, 13½" high, 10" deep. Available in 115 and 230 volts. Send for descriptive bulletin.

THERMO ELECTRIC MFG. CO.
486 W. Locust St. • Dubuque, Iowa

FASTER, BETTER PRODUCTION

"Blueprint for Faster, Better Production with Coated Abrasives" is the title of a new 16-page technical book in three colors, published by Behr-Manning, Troy, N.Y., in connection with Coated Abrasive products used in our country's all-out war effort.

Today, close tolerances in the manufacture of aircraft, ships, tanks, guns, engines, bombs, shells, bombsights and various precision instruments, to say nothing of the fine work which must be performed on dies and tools, have resulted in the development of many new finishing methods and tools.

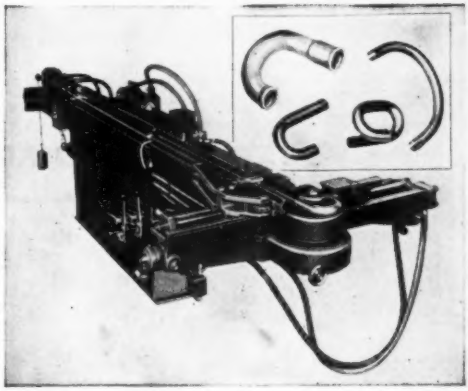
Only a year ago, little was heard or even known of the use of Spiracords, Pencils, Slotted Discs, Spirapoints and Spirabands, simply because most of these items had not been developed. There are thousands of plant engineers and production men who must be hungry for information on ways and means of cutting corners here and stepping up production there, or of producing better finishes and of doing jobs faster.

Such men will find many valuable suggestions within the covers of this book which also contains full data on these so called sanding "Gadgets". A copy of this timely piece of literature will be mailed by the manufacturer upon receipt of request.

BOOSTER ATTACHMENT FOR PINES BENDER

Shorter radius bends, faster production and saving in man-hours are claimed for this booster attachment. It permits operation by women.

It is in the form of a separate cylinder through which the mandrel rod passes. As the tube advances on mandrel during bending operation, booster cylinder applies pressure to rear end of tube and relieves tension ordinarily required to draw tubing off mandrel from already bent portion of tube.



In bending practice, the shortest radius bend possible is not determined by the maximum permissible elongation in material. It is determined by tension permissible in the already bent portion of tube which must transmit the force required to draw a tube over mandrel-tip. When force grows too great, the tension collapses the bent section. section will collapse from this tension. The booster attachment, by relieving this tension, is said to permit bends to be made with a radius which will allow stretching of the metal to maximum elongation.

A further advantage is that by allowing pressure on end of tube to continue after tube is unclamped in bending dies, the tube that has been bent is automatically removed from machine, increasing production substantially. This is particularly desirable when making 180° bends which frequently become wedged in dies and must be removed by force.

It is made by Pines Engineering Co., Aurora, Ill.

VERNIER CONVERTS MILLERS

A vernier attachment which converts Bridgeport Turret Millers into jig-borers is announced by Nichol Tool Co., Milwaukee, in descriptive literature.

Attaching and detaching are said to be quick and easy, needing no special machining, and affording precision accuracy. Design is based on years of practical application, and is said to embody convenience and utility features which owners of Bridgeports should immediately recognize.

Longitudinal scale is mounted in brackets attached to front of table. The vernier is carried in a bracket attached to the saddle. Transverse scale is mounted on the side of the knee, with vernier also carried in bracket attached to saddle.



With the attachment on a Bridgeport Turret Miller, it is said that many jig-boring jobs demanding tolerance within plus or minus .0002", can be done as accurately as on conventional jig-borers.

Buy your DIAMOND POWDER direct from the source

UNIFORMLY GRADED POWDER guaranteed 100% pure

quantities	up to 300 mesh	from 300 to 3200 mesh
from 200- 500 cts.	$1.20	$1.65
from 500-1000 cts.	1.10	1.55
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Prices per carat. Mesh size: U. S. Standards

INDUSTRIES TRADING COMPANY

15 PARK ROW NEW YORK, N. Y.

A NEW PROSSER GRINDER

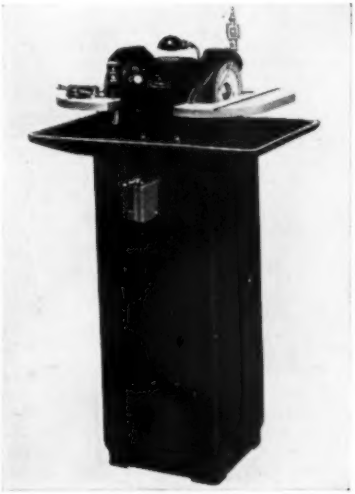
Thomas Prosser & Son, 120 Wall St., New York, announce a new model AA Floor Type Carbide Grinder, having all the features of other Prosser grinders, with a new heavy base, drum type on-off-reverse switch, heavier tables, storage compartment for wheels and tools, and other improvements.

The new machine provides for rapid removal of metal when roughing, together with accurate finishing of all single-point tools to smooth, keen cutting edges with flat surfaces, held exactly to the desired angles. Either silicon carbide or diamond wheels for grinding carbide, or aluminum oxide wheels for grinding stellite or high speed steel, may be used.

Among the features claimed are the simple, positive, quick-acting indexing device permitting quick setting of table to the desired angle and eliminating unnecessary loss of time and motion. The table "stays put" at the angle to which it is set.

The machine carries oversize 7" wheels, giving longer wheel life, and permitting the grinding of larger tools than the usual 6" wheels. Location of the hubs on the shaft is easily adjustable, to compensate for wheel wear. Face of the wheel can be kept close to the edge of the table, and wheels can be used up practically 100%.

The spindles run in high grade precision ball bearings, with adequate dust seals and elimination of all end-play.



Any desired combination of diamond, silicon carbide, or aluminum oxide wheels can be used, to suit individual needs, and to permit roughing or finishing to any desired degree of finish, or carbide, high speed steel, or stellite tools.

Various attachments can be furnished for the machines, such as a device for

"All Purpose"

STAND LAMPS

employing automatic friction joints, can be instantly adjusted in height and direction. Sizes from 75 to 1000 watts. INSTANTLY direct, glare protected light where urgently needed on those machine operations.

THE SAVE LAMP CO.

BALTIMORE, MD.



DIAMOND ACME TOOLS

Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.

ACME DIAMOND TOOL CO.
15 MAIDEN LANE, NEW YORK, N. Y.

Save TIME and MONEY

WITH THE

"BLANER" Universal Hand SPRING WINDER



Every shop and tool room needs it . . . a strong, dependable unit . . . quickly set up in any vise.

Increases production of hundreds of sizes of springs.

Write for illustrated folder, giving complete details

THE JOHN BLANER COMPANY
Corner Meek & Elm Sts.
SHARON PENNSYLVANIA

BAUMBACH



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Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die set that is unsurpassed. Let us prove it!

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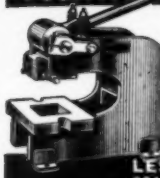


. . . And money, too! Cotton parts bags save up to 90% of packing and crating time, and mailing bags save up to 50% of postage and packaging cost. Write today for samples, prices and for FREE reprint: **"Cotton Bags in Work Expedition"**



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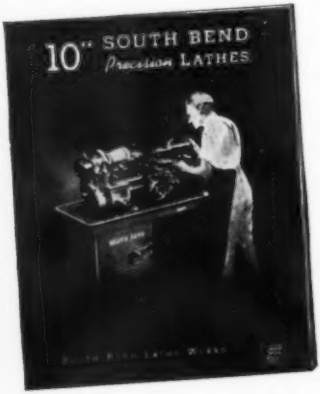
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TOOL POST TURRETS
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Saves Time... Saves Money...
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LESLIE HAND PUNCH PRESS
MOST CAPACITY
POSITIVE ALIGNMENT

Max. Cap. 2" dia. hole thru 10 ga. iron, proper shear on punch, throat depth 6". Takes punch press dies up to 3"x4½" in area. Leaf arm gives perfect alignment without ways or leader pins.
Portable. Used very successfully for "quick process" dies.
Write for information.
LESLIE WELDING CO.
2947 Carroll Ave. Chicago

grinding carbide or high speed steel drills of various sizes, and a simple arrangement for the grinding of chip breakers.

It is stated that prompt deliveries can be made, and a complete stock of silicon carbide, diamond, and aluminum oxide wheels is maintained at all times, to permit prompt shipment.

PRECISION LATHE CATALOG



Catalog No. 10 describing South Bend 10" Precision Lathes is announced by South Bend Lathe Wks., South Bend, Ind. It completely illustrates and describes South Bend 10" toolroom lathes and 10" quick change gear lathes in both floor leg and metal bench models. Attachments, accessories and tools are also listed.

Construction features are illustrated and specifications tabulated for ready reference. Both models are made in 2 types: 1-inch Collet and regular. Former has 1" maximum collet capacity and 12 spindle speeds (50 to 1357 r.p.m.) Latter has 11/16" maximum collet capacity and 6 spindle speeds (50 to 700 r.p.m.) Swing over bed and saddle wings is 10⅛" for both types.

SPECIALIZED SERVICE

A 20-page booklet in two colors (8½x11") gives pictorial presentation of products and services of V. E. Sprouse Co., a firm that specializes in design and production of small metal parts and complete assemblies of entire machines made from such parts.



Booklet also describes and illustrates the company's facilities for experimental design and model work, metal spinning, shearing and blanking, stamping, machine work, welding and brazing, contract manufacturing, etc. A copy will be sent on request written on your letterhead. Address:—V.E. Sprouse Co., Columbus, Ind.

TESTED THE *Minneapolis* PRODUCTION LATHE

★ ★ ★

EVERYONE LIKES IT

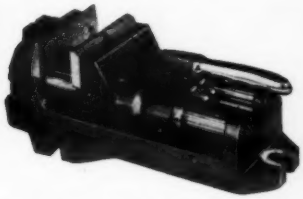
Inexperienced, as well as trained employees—men or women—can handle this production-boosting HEAVY DUTY machine. It's easy to operate—really turns out *accurate* War Work! Capacity 2¼" round bar. 14" swing. Spindle diameter 4". Mounted on Timken bearings. Spindle brake. Many other features — write for details.

EARLY DELIVERIES



Since 1890 **CENTRAL MACHINE WORKS CO.**
Central and 13th Ave. N. E. Minneapolis, Minn.

Safe Clamping of All Metals . . . . . Soft or Hard!



Because the Presto-Vise is so designed that its jaw pressure is adjustable according to the degree of hardness of the metal that is being clamped, it is a vise that can be safely used to clamp any kind of parts. The spoilage losses thereby eliminated pay for the vise in a remarkably short time.

With a jaw opening of 4½ inches, it is adapted to the speedy handling not only of small parts but also to the handling of parts that are fairly large. The Presto-Vise thus obviates the necessity of having an assortment of vises of different sizes. Easy to operate, it speeds up production tremendously.

Free CATALOG

Can Also Be Used As a Drill Jig

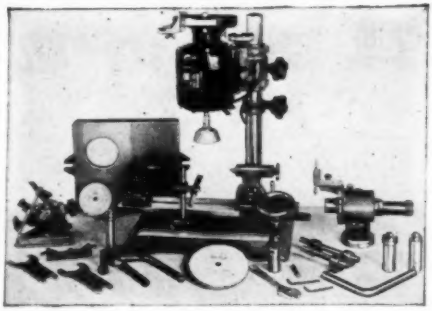
By using special Presto-Vise attachments, the Presto-Vise can be quickly converted into an adjustable drill jig.

D. A. SMITH & CO.
8087 Livernois, Detroit, Mich.

PRESTO-VISE

ROAN ANNOUNCES NEW TOOL AND CUTTER GRINDER

A new Roan Tool and Cutter Grinder is now offered by the Roan Mfg. Co., 1225 Washington Ave., Racine, Wis.



Highly versatile, the new Grinder is said to be equipped to handle practically all types of milling cutters. For example:—side and face milling cutters, end mills, tapered or straight or spiral reamers, spot facers, counterbores, hollow mills, shell end mills and staggered tooth mills, gear and form cutters, and circular saws. With equal facility, it is also used for contour grinding, and being easily portable it is useful for bench work.

Sturdily built, and having graduated adjustments throughout, the Grinder includes features that are said to make for simplicity of operation, fast set-ups and high-speed precision grinding of assured accuracy. Two of these features include a motor grinder head and bracket which can be raised, lowered and swiveled around—accurate vertical adjustment being assured by a vernier feed on motor bracket. Furthermore, motor itself can be swiveled to bring grinding wheels into any desired position.

To accommodate various types of tools, complete fixtures and accessories are provided. Noteworthy among these is a precision slide which can be used independently of the grinder as a bench center for indicating and inspecting tools. Next, is the O D grinding fixture, used for holding end mills and milling cutters, and special form tools which cannot be held on center. This is also used for grinding ends of end mills, side cutting teeth of milling cutters and many other facing tools of a wide range of sizes.

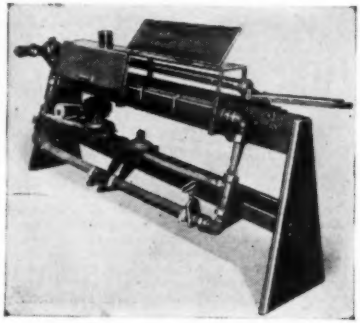
Unusually compact, the unit has a base 18x16" and column is only 25" high. Weight is 175 lbs, complete with all fixtures.

FLAME-TYPE ANNEALER

Use of steel for cartridge-containers brought sharp demand for a machine to give uniform anneal at or near mouth and speed tapering and crimping.

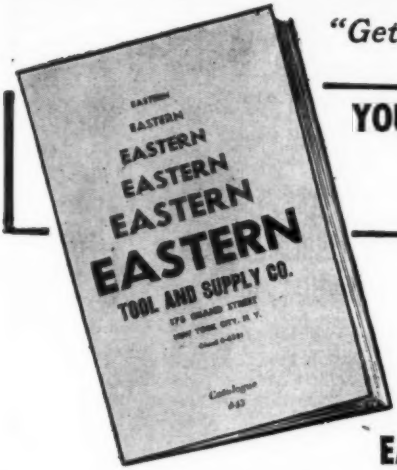
Accommodating Cal .50 and 20 mm cartridge cases, two general types of machines are now offered by Morrison Engineering Corp., 5005 Euclid Ave., Cleveland. Straight-line type, for smaller cases, is illustrated. Larger is a modified dial type. Both are gas-fired, and continuous conveying. Blast line type burners are provided, with adjustments to give compensation for varied gases and operating conditions. All controls, including proportional mixers and zero governors are supplied, providing for heating and holding or soaking sections.

Cases rotate as conveyed along in front of flame. Burner equipment can be furnished with height adjustments, where cases of different sizes are handled in one machine.



Furnished as complete units, including combustion blower and necessary motors and starters.

Approximate hourly production speeds range from 400, for 3", to 4,800, for 50 Cal. In most cases, says the maker, machines can be made to meet individual production needs.



"Get it from Eastern!"

YOUR NEW "BUY-WORDS" for MACHINE TOOLS

WRITE TODAY for YOUR COPY of our new catalog.

EASTERN TOOL SUPPLY CO.
176 GRAND ST. NEW YORK



DEALERS An attractive proposition open in certain territories.

WILLEY'S

NEW, DOUBLE END CARBIDE TOOL GRINDER

Assures highest accuracy for rough, semi-finish and finish grinding of Tungsten Carbide tipped tools. Its sturdy construction insures a large volume of work on a production basis. Uses 8" vitrified wheel for rough and semi-finish, and 6" diamond wheel for finishing.

Cool cutting is assured by a steady flow of coolant, force fed by an electrically driven pump.

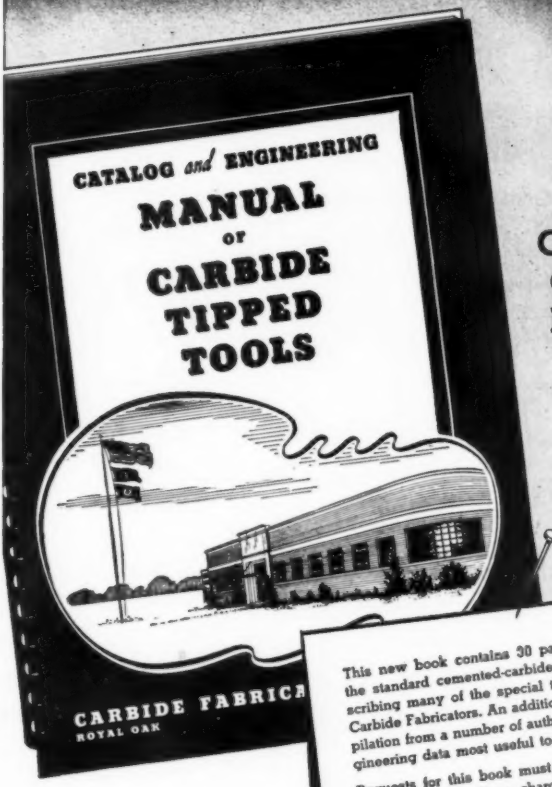
WRITE FOR FOLDER
Contains complete specifications of Model 30 and other models.

WILLEY'S CARBIDE TOOL CO.
1340 W. Vernor Highway, Detroit, Michigan

Mechanics Through the Ages



If You Use CARBIDE TOOLS



You'll Find A Wealth of Information in this COMPLETE CONCISE MANUAL

This new book contains 30 pages cataloging all of the standard cemented-carbide tipped tools and describing many of the special tools manufactured by Carbide Fabricators. An additional 24 pages is a compilation from a number of authoritative sources of engineering data most useful to users of carbide tools.

Requests for this book must be made on company letterheads. There's no charge or obligation.

Carbide Fabricators Co. ROYAL OAK MICHIGAN

MFRS. OF STANDARD AND SPECIAL CEMENTED CARBIDE TIPPED TOOLS

COMBINATION CENTER DRILLS

Special Alloy and High Speed Steel

Regular Type



Ground with Radial Relief

Included angle 60 degrees. Other angles made special to order.

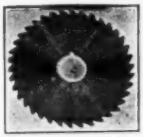
Size	DIMENSIONS Dia. Body	Dia. Drill	Length Overall	PRICE PER DOZEN Semi-H. S. Steel Net	H. S. Steel Net
A-1	1/8"	3/64"	1¼"	$2.50	$7.20
C-2	13/64"	1/16"	1⅞"	3.00	7.20
D-1	15/64"	5/64"	2"	3.25	7.20
E-1	3/10"	3/32"	2⅛"	3.50	7.20
E-2	3/10"	1/8"	2⅛"	3.50	7.20
F-1	7/16"	5/32"	2¾"	4.50	10.80
F-2	7/16"	3/16"	2¾"	4.50	10.80
J-1	1/2"	7/32"	3"	.....	16.20
J-2	1/2"	9/32"	3"	.....	16.20
M-1	5/8"	7/32"	3¼"	.....	21.60
M-2	5/8"	9/32"	3¼"	.....	21.60
N-1	3/4"	1/4"	3½"	.....	28.80
N-2	3/4"	5/16"	3½"	.....	28.80

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2½	1/16	⅞	1.68
2½	3/32	⅞	1.68
2½	1/8	⅞	1.68
3	1/32	1	1.98
3	3/64	1	1.98
3	1/16	1	2.04
3	3/32	1	2.04
3	1/8	1	2.10
3	5/32	1	2.20
4	1/32	1	2.58
4	3/64	1	2.64
4	1/16	1	2.70
4	3/32	1	2.82
4	1/8	1	3.00
4	5/32	1	3.12
4	3/16	1	3.30
5	1/16	1	3.48
5	3/32	1	3.78
5	1/8	1—1¼	3.96
5	5/32	1—1¼	4.20
5	3/16	1—1¼	4.44
6	1/16	1	4.38
6	3/32	1	5.02
6	1/8	1—1¼	5.16
6	3/16	1—1¼	6.24
8	1/16	1	10.00
8	1/8	1—1¼	10.50
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Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	¼x¼x2
R-101	L-102	5/16x5/16x2¼
R-103	L-104	⅜x⅜x2½
R-105	L-106	7/16x7/16x3
R-107	L-108	½x½x3½



Right—200 Series

Tool No.	Shank Size
200	¼x¼x2
201	5/16x5/16x2¼
202	⅜x⅜x2½
203	7/16x7/16x3
204	½x½x3½

Below—300 Series

Tool No.	Shank Size
300	¼x¼x2
301	5/16x5/16x2½
302	⅜x⅜x2½
303	½x½x3½



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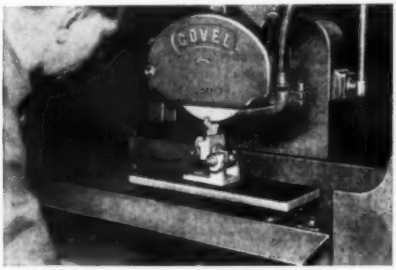


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